FIELD CROP ABSTRACTS

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REVIEW ARTICLE

FIELD BEANS IN GREAT BRITAIN

BY

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INTRODUCTION

Until the end of the second World War, there had been a remarkable lack of experimental work on the field bean crop in Britain. A few manurial and husbandry trials had been conducted at Rothamsted and Saxmundham and some work had been done on chocolate spot (*Botrytis fabae*), but there was an acute lack of scientific information on the best methods of cultivation. It is gratifying to know that during the last nine years, there has been a marked increase in the amount of research being undertaken at different centres. The Royal Agricultural Society of England, for example, has made a grant to the National Institute of Agricultural Botany for an investigation into the productivity of different strains; the Plant Breeding Institute at Cambridge has embarked on a breeding programme; fundamental work has been carried out at Oxford and Aberystwyth; aphis infestation has been studied at Rothamsted, and various other lines of enquiry are being pursued elsewhere. This article will attempt to summarise recent conclusions with regard to the crop.

MANURING

It is probably true to say that there have been relatively more inconclusive manurial trials with beans than with any other farm crop. The earlier rotation experiments of Oldershaw (1922, 1941), at Saxmundham showed that on a heavy boulder-clay soil, farmyard manure over a period of years gave better results than artificials alone; that on this soil, dressings of phosphate were beneficial; that phosphate and potash together gave better results than either separately, and that potash alone gave a relatively poor response. Boyd (1946), summarising all the available experimental results, concluded that though phosphate could give markedly increased yields in some circumstances, potash was in general, the more important fertiliser. In the Rothamsted experiments (1952) phosphate gave a small response in only one out of five trials (in contrast to its effect at Saxmundham), whereas potash gave small though fairly consistent increases in yield. In these experiments also, farmyard manure gave an average increase of 3·5 cwt. grain per acre in three out of the five trials. The response to potash was much smaller in the presence of the manure. In none of the published results (or in the author's experiments) has nitrogen applied to the seed bed, or as a top dressing, given any significant response. It can only be concluded that the response of the crop to fertilisers varies greatly with local soil, and possibly climatic conditions, and that large increases in yield can only be expected where a very marked soil deficiency in a particular element must be corrected. Response to farmyard manure is in general satisfactory, but whether this is due to its content of inorganic nutrients or to its physical effect on the soil is a matter for future research.

Another factor to receive attention recently is that of fertiliser placement. In a total of 19 experiments conducted at different centres in the eastern counties of England (Cooke and Widdowson, 1953), on both winter and spring types, band placement 1 in. below and 2 in. beside the seed was compared with early and late broadcasting at two levels of application. The conclusion is reached that band placement is the most beneficial method in most seasons, and that early broadcasting gives better results than broadcasting shortly before drilling. In the absence of placement drills, it is recommended that fertiliser should be spread, and either ploughed or cultivated into the land in the early stages of seed-bed preparation. Combine-drilling, particularly with spring beans, is dangerous, and may result in reduced germination. Interesting additional information is available from these experiments; the average increased yield of the fertilised plots over the controls in these 19 trials was of the order of 1-1·5 cwt. per acre and only in very few cases was this difference significant. This confirms the previous conclusion that in many cases the application of fertilisers can be expected to give only meagre results. Possibly the yield potential of many strains in use today is low, and it may be necessary to await new types before marked increases can be anticipated from fertiliser application.

The amount of fertilisers used by farmers has been investigated by Soper (1953) and in the Rothamsted survey of fertiliser practice. Only 22% of the fields in Soper's survey received farmyard manure, and 16%, phosphate and potash together. 40% of the fields (half of which had

previously carried two consecutive corn crops) received neither fertiliser nor manure. The Rothamsted survey in Worcestershire in 1953 showed that only 50% of the acreage received fertilisers or farmyard manure, though surveys in Sussex and Suffolk in 1954 gave rather higher percentages (Church, 1956). Even if the response of the crop to manuring is unpredictable, farmers do not seem to be giving it the fullest of opportunities.

Husbandry Factors

Recommendations on (1) date of sowing, (2) seed rate, (3) depth and method of sowing, and (4) drill width, are gradually becoming more concrete.

(1) *Date of sowing.* The Rothamsted workers (Boyd *et al.*, 1952), Greenwood (1955) and Soper (1952, 1953), all recommend sowing by the middle of October. Some of the Rothamsted experiments have failed from November sowing, for plant establishment is in most years markedly reduced by bird depredation, and the rotting of seed and young plants in cold, wet soil. If the subsequent winter is mild and open, sowing date is not so important, but all available evidence points to 15 October as the optimum date in the average year. Sowing earlier than this, e.g. late September, may result in serious frost damage to over-developed plants in late winter and early spring, or even to flower damage, by frosts in April or early May. With the spring crop, Soper (1952) found an average increase in yield of 4-5 cwt. per acre over two years from early-March sowing compared with early-April sowing. Both plant development and maturity before bean aphis attack are favoured by sowing before 15 March in a normal year.

(2) *Seed rates.* Variations between 2 bushels (126 lb.) per acre and 4·5 bushels (284 lb.) are found in field practice. The results of husbandry trials, surveys and detailed developmental studies point to the desirability of a relatively high seed rate. Rothamsted results (Boyd, *et al.*, 1952) have shown an 'economic' return from seed rates as high as 3 cwt. (336 lb.) per acre, but it should be stressed that in these trials the seed was ploughed-in and not drilled (the practical recommendation is to sow 1 bushel (63 lb.) more per acre when ploughing-in), and that in some years the crop was sown rather late. The maximum rate used in Soper's experiments (1952) was 252 lb. per acre, which showed increased yields of 3-4 cwt. per acre over 2 years, when compared with 126 lb. per acre. Greenwood (1955) has found no economic return from seed rates in excess of 200 lb. per acre, except when the crop is sown in November, when a higher rate becomes more important. Soper (1952a) has also shown that the seed rate may be influenced by the level of fertility of the field in question, and Hodgson and Blackman (1956) suggest that the yield curve of the crop starts to flatten out at plant densities arising from a seed rate of 200-250 lb. per acre. The evidence from all of these experiments points conclusively to 200-250 lb. per acre as the optimum seed rate for normal drilling in mid-October, but with later sowing, or ploughing-in of seed, this amount must be increased to 260 or even 300 lb. per acre.

(3) *Method of sowing.* Ploughing-in of the seed was widely practised in the past, and it has two merits : (a) birds cannot easily reach the seed, bird-damage is therefore greatly reduced ; (b) the seed is placed at a greater depth than is possible with most drills. Depth of sowing is most important on the lighter soils and those with a silt fraction, for shallowness may lead to frost damage to the exposed stem of the seedling, if the soil has settled after drilling. No recent yield comparisons are available between drilling and ploughing-in, but the former is now widely practised as subsequent inter-row cultivation is thereby facilitated.

(4) *Drill width.* This varies in field practice from 7-24 in., the wider spacings being the more popular. Konold (1940), in Germany, showed that inter-row width had no effect on yield, for any given density of plants per unit area. Recent work at Oxford (Hodgson and Blackman, 1956), has completely confirmed this finding. Very detailed experiments carried out over a period of three years have failed to demonstrate any effect on yield from varying row widths, at any specific plant density. In view of the necessity for keeping the crop as free from weeds as possible, there is every argument in favour of 21-24 in. spacing between the rows.

Developmental Studies

Soper (1952a) drew attention to the importance of climatic and soil fertility factors in the development of the individual plant, and to the interaction between plant density and physiological development. Hodgson and Blackman (1956), Rowlands (1956) and Picard (1955) have shown that the plant shows a very high degree of plasticity. The number of pod-bearing stems, the number of pods per stem, and the size of the seed are all variable, though the average number of beans in a pod does not appear to vary greatly. The yield of seed per given area is made up from the sum effect of these components. Each one can assume an important role under varying conditions of climate, soil and density, so that the population is to a large extent self-balancing. Yield is ultimately largely dependent on the number of pods produced per given area. With increasing density of plants per unit area, the number of pods per stem falls rapidly, as does the number of stems per plant and pod-bearing stems ; but the increased number of plants more than compensates for the decline in pods per plant until a maximum appears to be reached, in

Hodgson and Blackman's experiments, at a density of 35 - 40 plants per sq. m. This is equivalent to a seed rate of approximately 3·5 - 4 bu./acre, but it should be emphasised that in these experiments hand sowing with even spacing was employed, and better than normal plant establishment was achieved. In Picard's experiments with spring beans in France, the yield curve rises steeply up to a density of 40-50 plants per sq. m., and then begins to flatten. The higher figure here is probably due to the lower branching rate with the spring bean, for Hodgson and Blackman obtained similar results in one experiment with the spring type.

This detailed research confirms the conclusions previously reached as a result of larger field trials, that high rates of seeding are in general advantageous. One of the most striking features of the bean plant is the relationship between flower production and pod formation, and the interacting effect of plant density on these two functions (Soper, 1952a). Hodgson and Blackman (1956) found that at low densities a plant would produce more than 100 flowers, but that increasing densities might reduce this figure by 45%. Rowlands (1956), dealing with very widely-spaced plants, recorded a variation between 97 and 141 flowers per plant over three years. His plants produced 23-33 pods per plant, a pod-set of 20%-30%, but Hodgson's pod-set varied between 9% at the highest density plots and 14% at the lowest density. With a thick crop in the field, therefore, only 10%-14% of the flowers can be expected to develop into mature pods. Flowers were produced both at Oxford and Aberystwyth fairly consistently at the 6th node on the stem, but the node of first pod-set was found to vary with the season, and also to be higher at the higher plant densities. The pattern of pod production on the stem also varies widely from year to year and at different densities. At low densities, pods may be sited on as many as nine nodes, whereas at high densities they may be found on only three. The following reasons have been adduced to account for the phenomenon of flower- and early pod-wastage : (a) insufficient available phosphate or potash to permit pod and seed production, (b) lack of available nitrogen due to decay of the nodules at flowering time, (c) lack of specific growth substances at the time of flowering and pod formation, (d) shortage of carbonaceous substrate due primarily to light inhibition in a thick crop, (e) deficiency of adequate water, and (f) failure of the pollination mechanism.

Reasons (a) and (b) above are unlikely to be of much real importance in view of the comparatively large number of negative results achieved in manurial trials. Reasons (c) and (d) have been partially investigated by Hodgson (1955), who has experimented with the removal of the growing points of the plant, with the shading of certain areas, and with the spraying of a growth hormone. While marked changes in the pattern of pod production were induced by different treatments, it was apparent that the total number of fertile pods produced was not markedly affected when compared with the controls. Spraying of MCPA in varying concentrations has been carried out in the Netherlands in an attempt to assist pod retention, but it has given no beneficial results (Riepma, 1954). Hodgson has also recorded light intensities within the crop at different stages of growth, and has demonstrated a very rapid fall in intensity at the lower levels as the crop reaches the flowering stage. Lack of adequate light for maximum photosynthesis may prove to be an indirect factor in limiting pod production.

The water relationships (e) of the crop call for further research. A crop of field beans in May/June has a very high transpiration rate, and it is noticeable that vegetative growth is more vigorous in wet years. Schendel (1952) claims to have increased yield by artificial rain in the earlier vegetative phase, and Greenwood (1955) is testing the effect of irrigating the crop. Gliemeroth (1952) discusses water uptake by *Vicia faba* and draws attention to the limited ability of the crop to tolerate dry conditions, which is due more to a poor subsoil root system than to a high water-requirement. The value of farmyard manure may perhaps lie partly in the greater water reserves in the soil after its application. While in certain seasons water may prove to be a limiting factor in pod production, it is difficult to believe that it is the primary cause of flower- and pod-losses.

Plant Breeding

Finally, pollination is the crux of the reproductive process, and it is here that the studies of the physiologist join those of the plant breeder.

The structure of the flower of the bean suggests that it is well adapted to cross-pollination, and Rowlands (1955) concludes from pollen and pollen-growth studies of bean varieties from different parts of the world, that *Vicia faba* is essentially an outbreeding plant, though internal circumstances often bring about enforced inbreeding, with consequent genotypic unbalance. Fyfe (1951, 1954) has carried out extensive research into the extent of cross-fertilisation, and has found that approximately two-thirds of the fertile plants in the field are produced by self-fertilisation, and one-third by cross-fertilisation, though under unsatisfactory growth conditions, a higher proportion of cross-fertilised plants are found. Miss Drayner (1956), as a result of pollination experiments, claims to have established the existence of a regulating mechanism which maintains this constant breeding structure. On forced inbreeding the ability to set seed without flower manipulation is progressively lost, but on hybridisation, spontaneous self-fertility is restored.

She has shown that plants arising from cross-fertilisation in the previous year will set more seed from unvisited flowers than those in the population arising from previous self-fertilisation. However, seed set in the absence of bee visitation must be self-fertilised, so that plants of cross-bred origin will themselves carry more self-fertilised seeds. In turn, the plants derived from these seeds will only become fully productive once more with cross-fertilisation. An intermediate degree of heterozygosity is therefore maintained in spite of changing environmental conditions, such as fluctuations in bee numbers or bad growing seasons. Both Fyfe (1956) and Rowlands (1956) have evidence of heterosis, and one of the aims of the plant breeder is to produce 'synthetic' strains based on several selected lines, which will maintain heterozygosity and avoid excessive inbreeding. This course is being followed by Hayward (1952), who is developing stocks based on the mixing of selected strains. On a long-term basis, it may even be proved desirable and feasible to develop in-bred lines, and then to exploit heterosis to the full by controlled crossing of these lines, but this possibility is still some distance away in the future.

The work in progress at the National Institute of Agricultural Botany (Greenwood, 1955) is largely complementary to this basically genetical research. Stocks of both winter- and spring-types were collected from 107 sources, and have been tested in comparative trials. Very large genetic differences were found, and many of the stocks have been discarded owing to low yield, disease, or other undesirable qualities. Yield trials, combined with physiological studies, are being conducted on the more promising strains, and experiments to compare self- with cross-fertilisation have been laid down. It is interesting to note that research along similar lines is proceeding actively on the continent, for Picard (1954) in France, Moes (1954) in Belgium and workers at Wageningen are engaged on the testing of new lines of spring beans.

Pest Control

The most serious insect pest of the bean crop, particularly of the spring type, is the bean aphis (*Aphis fabae*). Winter beans are generally approaching maturity at the time of primary aphid infestation and do not appear to be attractive to the pest. They are sufficiently advanced in growth for damage to be of a minor nature. The spring bean is usually immature, and can be completely devastated if attacked seriously at an early stage.

Observation has shown that the intensity of initial infestation varies on different sides of a field, and is associated with shelter and wind direction during the primary migration of the winged aphids. The southern and western sides of a field are usually most heavily infested, so that shelter on the windward side is important (Taylor and Johnson, 1954). Recent experiments at Rothamsted have shown promising results in aphis control. Way (1954, 1955) recommends spraying with a systemic insecticide in mid-June. The time is important because (a) tractors can usually still be driven through the crop at that time, (b) the initial colonies are just becoming established in the heads of the plant and are therefore easily attacked, (c) the aphids are killed before they have had time to build up huge populations. The most promising materials are Demeton (Systox) and Metasystox, though nicotine, Parathion and gamma-BHC have all given satisfactory results. Spraying should be at the rate of at least 100 gal. per acre, and, with the contact sprays, it is clearly necessary to spray soon after primary infestation. Early sowing of the crop is most important if effective control is to be achieved. Masefield (1952, 1955) has recently referred to the possible importance of the bean weevil (*Sitona* sp.). The adult weevils, as is well known, may cause considerable damage to the leaves of the winter bean plant early in the spring, but the larvae also attack the nodules below ground, and can cause great destruction to them. Masefield has shown that the weight of the plant at onset of flowering is significantly correlated with the weight of the nodules (nodules decay rapidly in the post-flowering period), and that *Sitona*-infected plants had decreased plant weights. Control of adult weevils on the surface does not affect plant weight, but it is very difficult to destroy the larvae in the soil and this has not been satisfactorily achieved. Experiments are still continuing on the problem at other centres.

Disease

Since Wilson (1936) identified the fungus causing chocolate spot as a form of *Botrytis cinerea*, a certain amount of research has been carried out on possible methods of control. The disease is very sporadic in its incidence, for although it can be found in bean crops in most years, it is only occasionally that the attack becomes epidemic. Weather conditions have long been recognised as a major factor in determining the severity of the attack, but it is only recently that Hogg (1956) has been able to show that there is a definite correlation between the relative humidity of the air and the incidence of the disease in certain years in S.W. England. Moore (1944) concluded that routine dusting and spraying is unlikely to prove practicable or profitable, unless a forecast of an epidemic attack can be made. Recent work by Byrde, Crowdy and Woodcock (1953), however, opens up the prospect of the use of systemic fungicides. In trials with a considerable number of substances, some have been found which seem to provide a measure of protection, though it is unlikely that complete resistance can be expected. The importance of adequate levels of phosphate,

and particularly of potash, in providing resistance to an epidemic attack, has been noted on many occasions, and some experimental evidence to support purely observational conclusions was obtained in the Rothamsted experiments. Connold (1954) reporting on the 1948-52 bean trials in S.W. England emphasises the value of potash in countering chocolate spot infection. Dillon Weston (1945) concluded that dressing the seed with an organo-mercury compound did not influence the degree of infection of the subsequent crop, but it is possible that some of the new seed disinfectants may control attacks by other fungi on the young growing plant, and research to determine the value of seed dressing is still proceeding.

Where chocolate spot is likely to be widespread, as in the West of England, there is much to be said for the growing of a mixed crop of beans and cereals, for the incidence of infection is thereby much reduced.

Weed Control

The discovery of the newer herbicides has stimulated attempts to find more satisfactory methods of weed control, for, with the disappearance of hand hoeing, weed competition only too often leads to serious reductions in yields. The results are best summarised in the tentative recommendations of the British Weed Control Council (1956), viz. that the ammonium salt of Dinoseb (DNBP) can be used with safety on winter, (not spring) beans, at rates of 1-1·5 lb. per acre if applied in a high-volume spray when the beans are about 3 in. high. Spraying must take place before active spring growth begins. Experiments with spring beans and with the phenoxy-butyric compounds are proceeding but results are not yet available. An aspect of weed control that has also received attention, particularly in the Netherlands, is that of pre-emergence spraying and Riepma (1955) recommends that DNC at 2·25 lb. per acre or IPC at 4·5-5·25 lb. per acre will give satisfactory early control without damage to the crop.

Mixed Crops

For many years, it has been recognised that chocolate spot infection and aphis infestation are less severe when the bean plants are widely spaced in a cereal crop, but there has been no experimental evidence to show that the gross yield from a mixed crop was higher than when each crop was grown separately. Connold (1954) has demonstrated in farm trials in S.W. England during 1948-52 that higher yields of starch and protein are obtained from mixed crops than from individual crops. Greenwood (1955) also obtained evidence in 1954 of an increased yield from a mixture of winter beans and S. 172 oats when compared with either crop grown separately.

Conclusion

There are still many gaps in our knowledge of field beans in Britain, but the selection of new strains and varieties, the introduction of new insecticides and fungicides, and still more detailed research on the physiology of the crop hold considerable promise for the future. It can at least now be claimed that the crop is not so entirely neglected as it was ten years ago.

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CEREALS

WHEAT

330 STAPLE, W. J. and LEHANE, J. J. **Wheat yield and use of moisture on substations in southern Saskatchewan.** *Canad. J. agric. Sci.* 1954, **34,** No. 5, 460-8, bibl. 9. [Soil Res. Lab., Swift Current, Saskatchewan]

A summary is presented of 12 years' data on the use of moisture by wheat crops at 7 experimental substations in Canada. The linear regression of yield on evapotranspiration showed an increase of 3·5 bu. per ac. per additional inch of water used by the crop. The actual relationship was curvilinear, so that in conditions of high evapotranspiration the increase was about 6 bu. per ac. Estimates of yield were significantly improved where rainfall and stored moisture were used as separate variables. The regression coefficient for rainfall was 1·5 times that for stored moisture. After crop yields were adjusted for differences in moisture use on the basis of the residual variance, the remaining differences in yields between locations were just short of significant, while those between seasons were highly significant. Yields of wheat on fallow were not so highly correlated with total 24 month precipitation as with evapotranspiration because of variability in moisture storage during the 21-month summer fallow period. —From authors' abstract.

331 MILLER, J. D. and ROSS, W. M. **Relative yields of varieties of wheat on fallow and on cropland at Hays, Kans., 1951-52.** *Agron. J.* 1955, **47,** No. 7, 308-11, bibl. 1.

Yields of early, mid-season and late varieties of winter wheat on fallowed and on previously cropped land were compared. For 7 of the 32 years, data were unavailable due to crop damage under both systems by hail, and to failure of the plots on previously cropped land due to drought. Average yields for all varieties on fallow land were higher than on cropland in 17 of the 25 years and the difference between methods of cropping was statistically significant in 18 years. Significant positive correlations were found between yields of different maturity groups on fallow land and on crop land. The mean maximum June temperature caused a greater yield depression to the later-maturing than to the earlier-maturing varieties. Varietal yield tests on fallow, rather than on previously cropped land, are recommended at Hays because of less frequent failures due to drought, better stands and seed yields and easier detection of lodging and disease resistance.—P.M.G.

332 FOLTÝN, J. Agrotechnické lhůty setí ozimé pšenice. [**The timing of winter-wheat sowing.**] *Za social. Zeměd.* 1955, **5,** No. 17, 1025-46.

Following the development in Czechoslovakia of hardy regional varieties, winter wheat is now largely grown on hill and marginal land where, formerly, only rye could be produced. Yields of wheat may be increased by 0·75-2·5 cwt. per acre if the optimum sowing date is chosen. In a 3-year trial, late September sowings proved to be better than those of October or November. While spring grain should be sown at the earliest possible date, it is not easy to determine the optimum sowing date for winter varieties. Russian studies of the hardening process in plants have shown that two stages are involved ; the first (during which sugar is formed in the leaves) takes place under intensive light, with temperatures above freezing ; the second is marked by loss of water from the cells after freezing has begun. The lengths of both these stages depends on the length of the vernalization phase of the varieties concerned. The first stage requires a minimum of 5-10 days in the case of varieties with a short vernalization phase to a maximum of 25 days in varieties with a long vernalization phase. In the second stage these differences are smaller (6-9 days).—F.P.

333 HÄNSEL, H. Mehrjährige Frühjahrs-Saatzeiten-Versuche mit Winterweizen. Ein Beitrag zur entwicklungsphysiologischen Sortencharakteristik von österreichischen und anderen Winterweizen. [**Several years of spring-sowing trials with winter-wheats. A contribution to developmental, physiological, varietal characters of Austrian and other winter-wheats.**] *Bodenkultur* 1955, **8,** No. 2, 182-94, bibl. 24, illus. [Probstdorfer Saatzucht, Wien, Austria]

Foreign and Austrian varieties of winter-wheat were sown at various time intervals in spring to test their tendency to shoot. The tendency, determined by the cold requirement and length of day, was expressed by the number of days after sowing which were required to reach stage 10 on Feekes's scale, which is the stage just before mounting of the ear. Hohenhauer Kolben and Manitoba × Probstdorfer Kolben had the greatest, and Austrian Neusaat the least, tendency to shoot. None of the Austrian winter-wheat varieties could be regarded as interchangeable winter- or spring-wheats.—D.B.

334 BJAANES, M. Forsøk med vårkveitesorter 1948-52. **Trials with spring wheat varieties 1948-52.** *Forskn. Fors. Landbr.* 1954, **5,**

No. 3, 219-46, English summary pp. 245-6. The trials reported were carried out at 6 experiment stations in Norway. In trials at Vollebekk and at other locations in south-east Norway, Norrøna gave the highest average grain yields, with 275 kg. per decare, followed by Ås II 270 kg., Kärn II 270 kg. and Fram II 266 kg. per decare. Norrøna was very resistant to lodging. In the Hedmark and Oppland districts of east-central Norway, highest grain yields were given by Mø 043-40 (sister line to Norrøna), with 320 kg. per decare, followed by Norrøna 317 kg., Kärn II 315 kg. and Fram II 312 kg. per decare. In trials in west and south-west Norway, Norrøna gave the highest grain yield, with 307 kg. per decare, followed by Kärn II 281 kg., Ås II 280 kg. and Brons 278 kg. per decare. In trials in the Trondelag and in the Møre og Romsdal districts, Norrøna gave the highest yield of 362 kg. grain per decare, followed by Fram II 302 kg., and Snøgg II 293 kg. per decare. In the Salten district (lat. 67°N.), Fram II gave the highest grain yield, with 147 kg. per decare, followed by Skirne 140, Snøgg II 139 and Ås 134 kg. per decare. Norrøna gave the highest grain yield in all parts of the country where spring wheat is normally grown. It is equal to Diamant II and Ås II in straw-stiffness, and ripens 6 and 3 days earlier, respectively. Varietal recommendations are made for the different regions of Norway.—P.J.B.

335 FURUNES, J. Om årsikkerheten av vårkveitedyrking i Salten distriktet. **Yearly reliability of spring wheat in the district of Salten.** *Forskn. Fors. Landbr.* 1954, **5,** No. 5, 363-72, bibl. 4, English summary p. 371. [State Agric. Exp. Sta., Vågønes, Norway]

The results are given of estimations, using the very early variety Sibir, of the reliability of spring wheat for cultivation in the Salten district of Norway, situated at about 67°N. lat., where the available growth period lasts for approximately 125 days. The calculations made were based on trials with Sibir during 1931-44 at the Vågønes Station. It was estimated that the minimum required growth period for this variety was 128 days and that it could be relied on to give satisfactory grain yields and quality in only 55-60% of cases where it was grown in this district.—P.J.B.

336 ZUCCHINI, M. Le varietà elette di grano nelle prospettive cerealicole del Lazio. [**Selected wheat varieties for cultivation in Lazio.**] *Ital. agric.* 1955, **92,** No. 10, 707-11, illus.

Information is given on the wheat varieties grown in Lazio, central Italy, where the wheat area has increased during recent years. The recommended wheat varieties are: Funo, Mara, R 37 and S. Pastore, for the plain; Autonomia, Vivenza, Generoso, Funo, Roma and Salto, for the hills; Est-Mottin for the mountains. All these are varieties of soft wheat. Durum wheats, mainly the variety Cappelli, are also grown.—E.B.O.

337 MONTANARI, V. Verso l'autosufficenza del frumento in Italia. Indagine sulle varietà più produttive. [**Towards self-sufficiency for wheat in Italy. Investigation on the most productive varieties.**] *Ital. agric.* 1955, **92,** No. 9, 616-27, illus.

A review is given of the wheat position in Italy in 1954-5. The wheat area was about 4,830,000 ha., or 36·6% of the total arable area. Of the wheat area, 70·6% was sown with soft wheat [*Triticum vulgare*] and 29·4% with durum wheat [*T. durum*]. Information is given on the four most productive varieties of soft wheat, S. Pastore, Mara, Funo and Fortunato which yielded, on an average, 3203, 3716, 3000 and 3500 kg. per ha., respectively. Other good varieties of soft wheat were Damiano Chiesa, Impeto and R 37. For hard wheats, the old-established variety Senatore Cappelli was the most widely grown. It is thought that if the climate had been favourable in all regions to wheat cultivation, the 1955 wheat production would have approached the goal of 10,000,000 metric tons which would make Italy self-sufficient for wheat. [Although official data for 1955 wheat production are not given, this is calculated to have approached 9,000,000 metric tons.]—E.B.O.

338 PAVLIČIĆ, J. Strane sorte pšenice u našim uslovima gajenja. [**Foreign wheat varieties grown under Yugoslav conditions.**] *Arhiv. polj. nauke* 1955, **8,** No. 19, 68-106, bibl. 14, English summary pp. 105-6. [Inst. Pl. Prod., Zemun, Yugoslavia]

Experiments were carried out during 1950-3 to determine the possibility of acclimatizing certain ecotypes of wheat (*Triticum* spp.) to Yugoslav conditions. Winter and spring varieties were sown on 5 m.^{2} plots with 400 grains per sq. m. and a row distance of 20 cm. Observations were made on time of sprouting, tillering, over-wintering, earing, flowering, ripening, and resistance to *Puccinia* sp. The data show that the hydrophytic ecotypes of north and north-west Europe are unsuitable for Yugoslavia; the xerophytic varieties of the USSR have greater possibilities for adaptation; the mesophytic ecotypes of the Mediterranean area are more suitable for Yugoslavia than are hydrophytic types, the most important characteristic of the mesophytic types being their resistance to lodging. The mesoxerophytic types of the Pannonian Plain and the northern Balkans are most suitable for Yugoslav conditions. The North American varieties of high quality, and varieties from Asia and Australia are sensitive to

cold in Yugoslavia. Spring varieties of wheat are in general unsuitable for conditions in Yugoslavia.—M.H.

339 ERROUX, J. Les blés du Fezzan. [**The wheats of the Fezzan.**] *Bull. Soc. Hist. nat. Afr. N.* 1954, **45,** 302-17, bibl. 15, illus. [Received Sept., 1955]

A description is given of wheats found in areas of the Fezzan other than the Wadi el Ajal. [See *Fld Crop Abstr.* 8 : 374.]—E.B.O.

340 BRIGGS, F. N. **Registration of improved wheat varieties, 20.** *Agron. J.* 1955, **47,** No. 11, 543-5, bibl. 4. [Fld Crops Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

Varieties described are : Onas 53, Quanah, Frisco and Concho (Reg. Nos. 348-351, respectively). Onas 53 is a composite of 250 F_3 lines derived from Kenya × Onas 49. It is adapted to California, where it has greater resistance than Baart 46 or Kentana 48 to stem rust races 11, 17 and 56. It is not recommended for areas where risk of seed shattering is great. Quanah is a hard, red wheat, with milling and baking qualities similar to its Comanche parent, but is less winter-hardy. It is adapted to the Central and Rolling Plains areas of Texas. Frisco was developed from a cross (Fronteira × Red May) × Red May. It is an early-maturing, soft, red winter wheat, adapted to a relatively limited area of north-central Texas. Concho was produced from a cross Comanche × Blackhull-Hard Federation. In tests during 1949-54 in Oklahoma, Concho outyielded Comanche by 16% and Pawnee and Triumph by 22%.—P.J.B.

341 VILLANUEVA N., R. Ensayos preliminares para aumentar la producción de trigo en el Departamento de Cajamarca. [**Preliminary trials to increase wheat yields in Cajamarca Department, Peru.**] *Inf. 94. Esta. exp. agric. La Molina* 1955, pp. 24, illus., English summary pp. 23-4.

The average wheat yield in Peru, 982 kg. per ha., is less than the world average (1210 kg.), but the average wheat yield in Cajamarca is even lower, being 775 kg. per ha. The varieties for this region should be early, high-yielding, hardy and resistant to rust (*Puccinia* spp.). An account is given of yield trials carried out to test a great number of wheat hybrids (selected at La Molina Station) at three altitudes, 1950, 2250 and 2620 m. a.s.l., in 1953-4. The highest yields obtained were 2-5 times greater than those of the control varieties, which were those usually grown in the region of the trials. For regions situated at altitudes less than 2200 m. a.s.l., the varieties Marina, Mariache, Helvia, Blanco de la Molina and Yamalán, which yielded consistently well in 1952-4, are recommended.—E.B.O.

342 PASCALE, A. J. Método para determinar las características bioclimáticas de una variedad de trigo. [**A method for determining the bioclimatic characteristics of a wheat variety.**] *Meteoros, B. Aires* 1955, **5,** No. 1-2, 5-18, bibl. 7, English summary p. 5.

In the method presented, the tested variety is sown at 15-day intervals (from mid-March to mid-October in the example given). A parallel trial is carried out employing vernalized seed. During the trials, phenological observations are made on emergence, flowering and earing. Geslin's heliothermic index is used for interpreting the data. The values obtained for the tested variety are plotted on a graph and the resultant parabolas are compared with those of other wheat varieties whose bioclimatic characteristics are known.—E.B.O.

343 MCINTYRE, D. S. **Effect of soil structure on wheat germination in a red-brown earth.** *Aust. J. agric. Res.* 1955, **6,** 797-803, bibl. 9, illus. [Div. Soils, C.S.I.R.O., Adelaide]

Physical properties of soil were measured on two experimental plots which showed high compaction and poor germination of wheat under very wet conditions. The plot treatments were a 2-course and a 4-course rotation, and formed part of a permanent rotation trial at the Waite Institute. All physical measurements point to an oxygen deficiency for 2-3 weeks, and this could account for the poor germination and poor early growth, particularly in the 2-course rotation plots. The bad structure conditions leading to this are probably due to pulverizing by implements and dispersion over the years by heavy rain, rather than to a decrease in organic matter.—From author's summary.

344 BLAGOVEŠČENSKIĬ, A. V. and KIRILLOVA, G. A. [**The effect of temporary cooling on the content of nitrogenous substances in the embryo and endosperm of winter wheat.**] [Russian] *Doklady Akad. Nauk, SSSR* (*Proc. Acad. Sci., USSR*) 1955, **100,** No. 1, 171-3, bibl. 3.

The experiments described (3 replications) have given results which show that the basic change in nitrogenous substances which occurs when viable grain of winter wheat is subjected to cooling in a refrigerator [temperature not given] for various periods (12, 24, 36 and 50 days) is the breaking up of the protein molecule into a more mobile form. [See also *Herb. Abstr.* 8 : 239.]—M.H.

345 BHARDWAJ, S. N. and RAO, I. M. **Effect of pre-sowing seed-treatment with a sulphonamide on germination, growth and maturity of wheat.** *Sci. and Cult.* 1955, **20,** No. 12, 600-1, bibl. 5. [Agra Coll., Agra]

346 AHMAD, G. and HAMID, A. **Studies in selective weed control in the Punjab.** *Pakist. J. Sci.* 1954, **6,** No. 4, 209-17, bibl. 3, illus. [Punjab Agric. Coll. and Res. Inst., Lyallpur]

MCPA and DCPA were tested in wheat fields at Lyallpur from 1947-53. The use of DCPA in wheat cultures at early stages caused distortion of the ears and also reduced the yield. MCPA was found to be more satisfactory.—Authors' summary.

347 PURDY, L. H. **Comparative phytotoxicity of seed treatment fungicides used for wheat smut control in the Pacific Northwest.** *Pl. Dis. Reptr* 1955, **39,** No. 11, 850-2, bibl. 1. [Washington Agric. Exp. Sta., Pullman]

Tests were made of the phytotoxicity of 4 standard seed-treatment fungicides to Elmar, Brevor and Rio winter wheats and Idaed, Baart, Federation and Marfed spring wheats. The fungicides used were : Anticarie (40% hexachlorobenzene), Agrox (6·7% phenylmercury urea), Ceresan M (7·7% *N*-(ethylmercury) *p*-toluenesulfonanilide) and Panogen 15 (2·2% cyano(methylmercury) guanidine). The first 3 materials were applied at commercial rates of 0·5 oz. and Panogen 15 at 0·75 oz. per bu. of seed ; other rates ranged from 1 to 10 oz. per bu. All treated seed was held for 10 days before sowing. At rates over 1 oz. per bu., all the mercurial treatments were phytotoxic to the 3 winter wheats and to Federation spring wheat. Anticarie was non-phytotoxic at all rates of treatment used. There was some evidence that sowing in relatively cold soil increased the phytotoxicity of the mercuric compounds.—P.J.B.

348 SALT, G. A. **Effects of nitrogen applied at different dates, and of other cultural treatments on eyespot, lodging and yield of winter wheat. Field experiment 1952.** *J. agric. Sci.* 1955, **46,** Pt. 4, 407-16, bibl. 16, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

Two winter wheat varieties, Squareheads Master 13/4 (long-strawed) and Bersee (short-strawed) were compared at 2 seed rates. Sulphate of ammonia was applied at 0, 2 and 4 cwt. per ac. at 4 different dates. Some of the blocks were sprayed in March with sulphuric acid to control eyespot, *Cercosporella herpotrichoides*. Lowering the seed rate from 3 to 1·5 bu. per ac. decreased eyespot and the area lodged and increased the mean yield of the 2 varieties by 4·9 cwt. in unsprayed, and 2·1 cwt. per ac. in sprayed plots. Spraying the variety Squareheads Master decreased the straws with severe lesions from 66 to 17%, decreased the area lodged from 95 to 36%, and increased the grain yields from 22·4 to 32·4 cwt. per ac ; spraying Bersee decreased severe lesions from 56 to 15%, decreased lodging from 54 to 1% and increased the yield from 32·6 to 43·5 cwt. per ac. The mean percentage infection at harvest was little affected by N applied in March, April or May, but was decreased by N applied in October. The weight of straw and the extent of lodging were increased more by top dressings in March and April than by those in May. Plots receiving N in March and October had similar weights of straw, but the latter, with less eyespot, lodged less. Where lodging was slight, grain yields were increased equally by N applied at each date ; where lodging was extensive, yields were depressed by dressings in March and April, and increased by those in October and May. Sulphate of ammonia applied at 0, 2 and 4 cwt. per ac. to sprayed, (upright) plots of Bersee gave yields of 36·8, 42·9 and 47·3 cwt. of grain, respectively, whereas when applied to unsprayed (completely lodged) plots of Squareheads Master yields were only 22·4, 22·0 and 22·9 cwt. per ac., respectively.—From author's summary.

349 MCNEAL, F. H. and others. **Wheat stem sawfly damage in four spring wheat varieties as influenced by date of seeding.** *Agron. J.* 1955, **47,** No. 11, 522-5, bibl. 7. [Montana Agric. Exp. Sta., Bozeman]

Two solid-stemmed spring wheats, Rescue and B49-90 (Merit-Pilot × Rescue) and 2 hollow-stemmed varieties, Thatcher and C.I.12733 (Merit-Pilot × Henry) were sown on 6 May, 15 May and 17 June, 1953, and on 6 May, 17 May and 31 May, 1954, on dry-land in Montana under conditions of heavy infestation with *Cephus cinctus*. A comparison of grain weights from plants with cut stems and stems tunnelled in 1, 2, 3 or 4 internodes showed no significant differences. Stem tunnelling caused a decrease in kernel weight in all cases, except in C.I.12733 and Thatcher sown on the second date in 1953 and Thatcher sown on the second date in 1954. Losses in kernel weight per plant were highest from sowing at the first date except in 1954, when losses in kernel weight where the first and third sowing dates were used averaged 13·8 and 19%, respectively. In years when available moisture was above normal, losses of kernel weight were thought likely to range up to 5%, and, in exceptionally dry years, up to 20%. Solid-stemmed varieties appeared to be less likely to be cut than hollow-stemmed varieties, even where both were tunnelled by larvae. The earliest variety C.I.12733 suffered the most cutting and Rescue the least.—P.J.B.

350 CANGARDEL, H. Recherches sur les traitements chimiques contre les punaises des blés. [**Investigations on chemical control of bugs on wheat.**] *Terre maroc.* 1955, **29,** No. 311, 393-401.

In a field trial to control *Aelia germari* on soft wheat, treatment with methyl Parathion dust at

1·25% active principle, applied at the rate of 25-30 kg. per ha., gave a high percentage mortality. —E.B.O.

351 POTTER, C. and others. **Studies on the chemical control of wireworms (*Agriotes* spp.). 1. The direct and residual effects of BHC, DDT, D-D, and ethylene dibromide.** *Bull. ent. Res.* 1956, **46,** No. 4, 913-23, bibl. 35, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

Two experiments, lasting 4 years, were carried out in a field infested with wireworms to test BHC, DDT, ethylene dibromide and D-D for controlling wireworms attacking wheat. The treatments applied were : (a) a dust containing 3·5% crude BHC, broadcast immediately before sowing at the rate of 7·9 lb. crude BHC per ac. (15·2-16 oz. γ-isomer), or combine-drilled with the seed at rates of 0·98-3·92 lb. of crude BHC per ac. (1·9-8 oz. γ-isomer) ; (b) a seed dressing containing 20% technical γ-isomer of BHC applied at the rate of 2 oz. per bu. ; (c) technical DDT drilled with the seed at the rate of 7·2 lb. per ac. ; (d) ethylene dibromide and D-D injected into the soil as soil fumigants at 45·5 and 210 lb. per ac., respectively. All these treatments increased yields considerably over the controls in the season following treatment. The highest yields were obtained from the plots treated with ethylene dibromide (32·1 cwt. per ac.) and BHC broadcast (30·6 cwt.), and the lowest from the plots treated with DDT (20·7 cwt.). The yield from the untreated plots was 8·9 cwt. per ac. In the following year the plots were sown without further treatment and wireworm damage, as judged by the yield of the control plots, was much less, showing that BHC combine-drilled, BHC broadcast and DDT had a substantial residual effect ; the soil fumigants, especially D-D, were somewhat less effective while BHC seed dressing showed no residual effect. In subsequent years the above residual effects were less marked.—E.B.O.

352 SALLANS, B. J. and SIMMONDS, P. M. **The influence of variety and predisposing factors on the occurrence of yellow berry (starchiness) in wheat.** *Canad. J. agric. Sci.* 1954, **34,** No. 4, 393-405, bibl. 15. [Pl. Path. Lab., Saskatoon, Saskatchewan]

Yellow berry, or piebald, a condition of starchiness or partial starchiness of wheat kernels, was increased in greenhouse experiments by adding KH_2PO_4 to the soil, but was reduced by adding $NaNO_3$. Thus, it was concluded that the yellow berry condition may have been caused by a deficiency of soil nitrogen, particularly during the post-flowering period, in relation to the general level of photosynthetic activity. Environmental and nutritional factors which tended to increase wheat yields also tended to increase the incidence of yellow berry ; yield increases consequent on the use of N-containing manures, in most cases, appeared to be associated with a reduced incidence of yellow berry. The results of greenhouse experiments to test the inherent tendency of 6 wheat varieties to develop yellow berry, showed that Garnet and Regent were relatively resistant to the condition, Red Bobs, Marquis and Mindum were relatively susceptible, while Thatcher occupied an intermediate position. Control of yellow berry was thought to depend mainly on the use of resistent varieties and the maintenance of adequate soil N.—P.J.B.

353 MACKEY, J. **The taxonomy of hexaploid wheat.** *Svensk bot. Tidskr.* 1954, **48,** No. 2, 579-90, bibl. 43. [Swedish Seed Ass., Svalöf]

An examination is made of existing classification systems for hexaploid wheat from the genetic and agronomic standpoints. All hexaploid wheats are considered as comprising one species, *Triticum aestivum*, divided into the subspecies *compactum*, *sphaerococcum*, *vulgare*, *spelta* and *macha*.—P.J.B.

354 STOY, V. **Action of different light qualities on simultaneous photosynthesis and nitrate assimilation in wheat leaves.** *Physiol. Plant.* 1955, **8,** No. 4, 963-86, bibl. 34, illus. [Bot. Lab., Univ. Lund, Sweden]

355 SINGH, M. M. **Epidermal characteristics of plants in relation to earliness in flowering.** *Sci. and Cult.* 1955, **20,** No. 10, 506-7, bibl. 4. [B.R. Coll., Agra]

Epidermal peelings were obtained from the dorsal side of the flag leaf in 2 wheat varieties, one early (N.P. 165) and the other late (Pb. 8-A), and the stomata and epidermal cells were counted and measured. The early variety was characterized by higher frequency but smaller size of stomata and epidermal cells compared with the late variety, and an inverse relationship between the size and the number of cells was evident.—G.M.R.

356 KASAI, Z. and OKUDA, A. **Translocation of mineral nutrients in higher plants. 1. Distribution of phosphorus in harvest of wheat and sesame, absorbed at each stage of growth.** [Japanese] *J. Sci. Soil, Tokyo* 1955, **26,** No. 5, 188-92, bibl. 5, English summary p. 192. [Food Sci. Res. Inst., Univ. Kyoto, Japan]

Data are given of the distribution of P^{32} in wheat and sesame [*Sesamum indicum*] plants grown in sand cultures and receiving P^{32} in the nutrient solutions for different weekly periods, during May in the case of wheat, and mid-July to mid-August in the case of sesame.—P.J.B.

357 YATAZAWA, M. and NAMIKI, M. **Direct evi-**

dence of foliar absorption of urea. Synthesis and utilization of N^{15} rich urea. [Japanese] *J. Sci. Soil, Tokyo* 1955, **26,** 219-22, bibl. 10, English summary p. 222. [Shiga Agric. Coll., Japan]

A method for synthesizing urea containing N^{15} is described. In studies with wheat, 2% solutions of urea containing N^{15} were applied as foliar sprays 5 days before heading. At 14 days later, 8·6% of the applied urea was in the ears, 27% in the flag leaves, 8·5% in the stems and roots and 21·5% in the leaf sheaths of the treated leaves.—P.J.B.

358 BHARDNAJ, S. N. and RAO, I. M. **Studies on the effect of 2,4-D, NAA and IAA on growth and maturity of wheat.** *J. Indian bot. Soc.* 1955, **34,** No. 1, 21-8, bibl. 16. [Bot. Dep., Agra Coll., India]

Seed of the wheat strains C.591 was left unsoaked, or soaked in 10 or 100 ppm. concentrations of 2,4-D, NAA, or IAA, or in water, for 24 hr. at 17-19°C. The seed was then sown in pots. Sprouting was inhibited by 2,4-D, NAA and IAA solutions, particularly at the 100 ppm. concentration. IAA caused the greatest inhibition of sprouting, followed by NAA and 2,4-D. At 4 weeks after sowing, all 3 substances, except 2,4-D at 10 ppm. concentrations, retarded growth. Growth retardation was greatest in plants treated with IAA. Leaf numbers followed the same trend as height, but tillering was unaffected. At the shooting stage, plants treated with 10 ppm. of 2,4-D or IAA averaged 29·9 and 28·3 cm. in height, respectively, compared with 24.3 cm. for controls. Water-soaking the seed and the use of 10 ppm. IAA hastened flowering by 3·5 and 4·5 days, respectively. Plant dry-matter production where the seed was water-soaked, or treated with 10 ppm. of 2,4-D, NAA, or IAA, averaged 15, 42 and 54% above, and the same as, that of controls, respectively; grain yields following these treatments were 4% below, 42% above, 23% above and 2% below those of controls. Concentrations of 100 ppm. 2,4-D or NAA decreased dry-matter and grain yields, while 100 ppm. IAA treatments increased these components slightly.—P.J.B.

359 THORNE, Gillian N., and WATSON, D. J. **The effect on yield and leaf area of wheat of applying nitrogen as a top-dressing in April or in sprays at ear emergence.** *J. agric. Sci.* 1955, **46,** Pt. 4, 449-56, bibl. 17, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

Nitrogen, at the rate of 0·5 cwt. per ac., was applied to winter wheat as an April dressing of nitrochalk or as 8 sprayings of 2% NH_4NO_3 solution applied either to the soil or to the leaves at about the period of maximum leaf area, before and during ear emergence. All 3 methods of N application caused similar increases in yield and N content of grain. April N gave a greater yield of straw than the later dressings. Late N application caused a small increase in leaf area index [L.A.I., leaf area per unit area of land], first noticeable one week after ear emergence and persisting for another 4 weeks. L.A.I. of plots that received N in April was much larger than that of the other plots at the period of maximum leaf area, but by 4 weeks after ear emergence it was less than that of plots receiving the late N. Shoot number per metre and leaf area per shoot were increased by early N, but only the latter was increased by N applied at ear emergence. Leaf area duration [L.A.D.] after ear emergence was the same on all N-treated plots and the yield of grain divided by L.A.D. was nearly constant for all plots. Applying N late, after an April dressing, did not prevent the rapid fall in L.A.I. from the high value reached at the period of maximum leaf area and caused no greater increase in yield than when applied in the absence of an April top dressing. A single urea spray applied in early June increased yield to the same extent as the ammonium nitrate sprays.—Authors' summary.

360 RAHEJA, P. C. and MISRA, M. D. **Development studies in crop plants. 1. Influence of nitrogen, phosphate, potash and calcium, alone and in combination, on wheat.** *Indian J. agric. Sci.* 1955, **25,** No. 2, 87-104, bibl. 18, chart. [Indian Agric. Res. Inst., New Delhi]

The following are some of the effects of various levels of N, P, K and Ca and their combinations on the growth and development of wheat. Germination was not affected by any of the nutrients and their combinations. Tillering began 17 days after germination; maximum shoot number was observed 66 days after sowing, and later a heavy mortality of shoots was recorded. Nitrogen encouraged tillering and promoted greater survival of shoots at harvest (20% higher) and phosphate also promoted survival of shoots at harvest (4% higher than no P), but with the application of K there was a 4% decrease in the shoot number compared with control. The effect of Ca on shoot emergence was slight. The differences in functional leaves were least marked. N and K induced significant variations in the number of grains per ear although the variations in ear were small, N producing an increase and K a decrease in the number of grains. An increased application of N brought about lodging of the crop, entailing a loss of 63% in grain and 36% in straw yield.—From authors' summary.

361 SORGER-DOMENIGG, H. and others. **Grain storage studies. 20. Relation between viability, fat acidity, germ damage, fluorescence value, and formazan value of commercial**

wheat samples. *Cereal Chem.* 1955, **32,** No. 6, 499-506, bibl. 10. [Inst. Agric., Univ. Minnesota, St. Paul]

362 CHRISTIENSEN, C. M. **Grain storage studies. 21. Viability and moldiness of commercial wheat in relation to the incidence of germ damage.** *Cereal Chem.* 1955, **32,** No. 6, 507-18, bibl. 10, illus. [Inst. Agric., Univ. Minnesota, St. Paul]

363 GADD, I. Lagring av betat vårvete. En orienterande översikt. [**Storage of dressed spring wheat. A preliminary review.**] *Medd. Frökontrollanst., Stockh.* 1954, No. 29, 62-78, English summary pp. 77-8.

Storage trials were carried out in 1953 with spring wheat seed treated with Panogen at rates 0·75, 1·5, 2, 2·75 and 3·5 times the normal dose (200 ml. per 100 kg. seed). The seed samples were either dried or not dried, had different degrees of ripeness and were threshed either by hand, or by machine. The seed was stored in a cold, humid cellar, with air at about 100% relative humidity or in a relatively dry, cool room, for periods up to 3 months. Seed samples not dried and stored in the damp cellar had moisture contents of 19-24% in all but one case. Only where the dose of Panogen exceeded twice the normal, did germination decline markedly after 3 months' storage. Seed samples held in a relatively dry room had moisture contents ranging from 13·2-14·4%, Panogen doses up to 3·5 times the normal had no apparent effect on germination except in the case of machine-threshed seed, stored under conditions that permitted some heating for a short time. Damage caused by machine threshing markedly lowered germination after 3 months' storage under damp conditions ; under dry conditions, the germination of such seed fell very little below that at the start of storage.—P.J.B.

364 GORRINGE, S. **Fumigation of agricultural products. 11. Sorption of mercury vapour by wheat.** *J. Sci. Fd Agric.* 1955, **6,** No. 12, 791-9, bibl. 9, illus. [Imp. Coll. Fld Sta., Sunninghill, Berks]

A more sensitive modification of an ultra-violet absorption method for detecting mercury vapour is described. Sorption on wheat is influenced much more by changes in the moisture content than by changes of temperature within the normal range of both factors. Most of the mercury sorbed is chemically combined but with the drier grain some can be recovered by airing. The reaction of mercury vapour with wheat continues even after 2 years' exposure to the fumigant. Concentrations of mercury lethal to normal grain weevil eggs are likely to extend for 2 ft. around foci of diffusion in a mass of grain.—From author's summary.

365 PALACIO del V., G. El trigo en Colombia. Estudio económico. [**Wheat in Colombia. An economic study.**] *Agric. trop.* 1955, **11,** No. 9, 715-23.

OATS

366 ÅKERMAN, Å, and MacKEY, J. Svalöfs vithavre Seger II. **Svalöfs Seger II white oats.** *Sverig. Utsädesfören. Tidskr.* 1955, **64,** No. 4, 238-40, English summary p. 240.

Seger II (Victory II) was selected from a cross between Seger I and Sv 33/2067, the latter being a selection from an indigenous Jämtland strain. In trials carried out by the Swedish Seed Association during 1943-53 at 8 locations, Seger II outyielded Seger I by an average of 2·5%. In the Östgöta and Grensholm districts, it outyielded Seger I by 5 and 5·3%, respectively. In those districts to which Seger II is adapted, it is recommended for growing on relatively less fertile clay soils as a replacement for Seger I and such high-yielding varieties as Sol II (Sun II), Blenda and Örn (Eagle). Seger II is superior to Seger I in straw-stiffness.—P.J.B.

367 MURPHY, H. C. **Registration of oat varieties, 20.** *Agron. J.* 1955, **47,** No. 11, 535-8, bibl. 15. [Fld Crops Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

Varieties described are : Alamo, Cimarron, Seminole, Floriland and Victorgrain 48-93 (Reg. Nos. 133-137, respectively). Alamo was produced in Texas from (Victoria × Hajira-Banner, C.I. 4019) × (Fulghum × Victoria, C.I. 3528). Alamo is an early-maturing variety, averaging 7 days earlier than New Nortex. It is suited for direct combine harvesting. In southern stations in Texas, Alamo yielded an average of 50·3 bu. grain per ac. compared with 47·3 bu. for Mustang and 38·8 bu. for Fultex, during 1947-53. At northern stations, Alamo yielded an average of 54 bu. per ac., compared with 48·2 bu. for Mustang, 46·9 bu. for Fultex and 46·1 bu. for Frazier. Cimarron was developed in Oklahoma and was a mass selection for early-maturing panicles from Woodward Winter Oat Composite (C.I. 3527). It is extremely early-maturing, short-strawed and winter-hardy, and is able to yield well following both autumn and spring sowing. When autumn-sown, it has outyielded the winter varieties Tennex, Forkedeer and Wintok. When spring-sown, only Andrew was able to outyield Cimarron, and that by a small margin. Seminole originated from a cross Appler × (Clinton × Santa Fe). It is early, has an upright growth habit, but is not winter-hardy. It is adapted to the Coastal Plain region, where it outyielded Floriland, Sunland, Southland and Red Rustproof. Floriland originated in N. Florida from

a cross Florida 167 × Landhafer. It has high grain yields and a high degree of resistance to *Puccinia coronata*. It has outyielded Southland in grain yield and matures about 10 days earlier. The kernels are awned and grain quality is poor. Victorgrain originated in S. Carolina as a selection from Victorgrain C.I. 4388. It is a high-yielding stiff-strawed, awnless, medium-early variety with a wide range of adaptation. It is sufficiently winter-hardy for growing throughout the Coastal Plain and South-eastern Piedmont regions.—P.J.B.

368 HELLBO, E. Vippgrensknutan som sortkännetecken hos havre. **Swollen bases of primary panicle branches as variety characters in oats.** *Medd. Frökontrollanst., Stockh.* 1954, No. 29, 41-6, bibl. 3, illus., English summary p. 46.

The possibilities of using the size and shape of the lower swollen part of primary panicle branches and the length and frequency of hairs on those parts, for distinguishing between varieties of oats is discussed. Illustrations are given of these parts in Svalöf's Stjärn, Sol II, Seger I and Primus, and a table is given showing the normal length and frequency of the hairs in a number of white and yellow oat varieties.—P.J.B.

369 EBERHARDT, F. Über fluoreszierende Verbindungen in der Wurzel des Hafers. Ein Beitrag zum Problem der Wurzelausscheidungen. [**On fluorescent compounds in oat roots. A contribution to the problem of root secretions.**] *Z. Bot.* 1955, **43,** No. 5, 405-22, bibl. 19.

The chemical nature of the fluorescent secretions from oat roots has been determined by paper chromatography, and the distribution of the fluorescent compounds in different parts of the embryo, radicle and root, has been established. Four compounds were identified. Of these, scopoletin was concentrated in the tips of the root-hairs. Scopoletin, together with its glucoside and another unidentified glucoside, was secreted by the living roots into the external medium. The ecological significance of this secretion in inhibiting growth of other plants is discussed.—D.B.

370 NORSTOG, K. J. **Responses of the oat coleorhiza to various treatments in culture.** *Ohio J. Sci.* 1955, **55,** No. 6, 340-2, bibl. 5. [Biol. Dep., Wittenberg Coll., Springfield, Ohio]

Observations are made on the growth of the coleorhiza of germinated oat seed and embryos at different stages of maturity, as influenced by different oxygen tensions and growth substances in the culture media.—P.J.B.

371 ISHIZUKA, Y. and OGATA, S. **Biochemical studies on characteristics of growth phases of crops, induced artificially by photoperiodic treatments. Morphological observations on oat plant.** [Japanese] *J. Sci. Soil, Tokyo* 1955, **26,** No. 5, 161-7, bibl. 14, English summary p. 167. [Agric. Fac., Univ. Hokkaido, Japan]

372 WATERSON, H. A. **Some aspects of the use of synthetic plant growth regulating substances in oat crops.** *Agric. Progr.* 1954, **29,** No. 1, 54-9, bibl. 17. [West Scot. Agric. Coll., Auchincruive, Ayr] [Received Nov., 1955]

Trials were carried out in 1951 and '52 to test the effect of the sodium salt of MCPA applied at 0, 2 (the normal rate), 4, 6 and 8 lb. in 100 gal. of water per ac., on the growth and yield of the oat variety Yielder. Spraying early (May) at the normal rate, when the oat plants were 6-8 in. tall and weed seedlings small, reduced the yield 20% below those from unsprayed crops, and higher rates of application caused greater reductions. Spraying late (June) when the crop was 16-18 in. tall and the weeds also larger, resulted in far smaller yield losses, especially at the higher rates. The root systems of plants in all treated plots showed a reduction in size compared with those in unsprayed plots. The straw of plants sprayed at 4 lb., or more, per ac. did not ripen properly and was weak. Crops sprayed at 8 lb. per ac. showed nearly 100% lodging. MCPA had no effect on the percentage germination or the subsequent growth of the seedlings. It was also noted that MCPA improved the 1000-grain weight, raised the N and ash contents but lowered the oil content of the grain, and gave a slight increase in the proportion of light, empty grains present.—M.P.

BARLEY

373 MINISTRY OF AGRICULTURE NORTHERN IRELAND. **Reports from the Counties. Malting barley variety trials.** *Mon. Rep. Minist. Agric. N. Ire.* 1955, **30,** No. 7, 205-8.

Trials conducted from 1951-4, inclusive, in North Down showed Freja, Carlsberg, Beorna and Proctor to be similar yielders and superior to Spratt Archer. Freja was the earliest to mature and was most resistant to lodging. In malting quality, Beorna was slightly superior to Carlsberg and Proctor, while Freja appeared to be the least satisfactory. The results indicate that, of the varieties tested for more than one year, Carlsberg is at present the most suitable malting barley for North Down.—M.P.

374 JOHNSON, I. J. **Registration of barley varieties, 13.** *Agron. J.* 1955, **47,** No. 11, 532, bibl. 2. [Iowa State Coll., Ames]

Cordova (Reg. No. 25) was produced from a cross Winter × Texan. It is a 6-rowed, intermediate, winter-type barley, with smooth awns. It is sufficiently cold-resistant for all parts of Texas, except the High Plains region. Where autumn-sown at 8 locations in Texas during 1947-52, Cordova yielded 41 bu. grain per ac., compared with 37 bu. for Tenkow, 36 bu. for Texan and 34 bu. per ac. for Wintex.—P.J.B.

375 RUSSELL, R. C. and TYNER, L. E. **The influence of temperature on the time required to control loose smut of barley by means of the Spergon or water-soak treatments.** *Canad. J. agric. Sci.* 1954, **34,** No. 5, 533-8, bibl. 7. [Pl. Path. Lab., Saskatoon Saskatchewan]

The studies reported were made to define closely the temperatures needed to control smut [*Ustilago nuda*] in barley at given immersion periods in water, or in 0·2% suspensions of Spergon (tetrachloro-para-benzoquinone). With Spergon, virtually complete control was secured by soaking the seed for 48 hr. at 72° or 76°F. With water-soak treatment, complete control followed soaking for 64-90 hr. at 72 or 76°F. Little or no stand reductions followed the treatments, except where temperatures of 76°F. were used for 72-90 hr. Treatment at 80°F. for 62 hr. gave complete control of smut, but reduced subsequent grain yields by 22%. For normal farm practice, using open containers, it was concluded that water-soaking treatment for 80 hr. at 66°F., 65 hr. at 72°F., 55 hr. at 76°F. or 35 hr. at 86°F. were satisfactory procedures ; with Spergon suspensions, soaking for 48 hr. at 72°F. was satisfactory.—P.J.B.

376 FOLKES, B. F. and YEMM, E. W. **The amino acid content of the proteins of barley grains.** *Biochem. J.* 1956, **62,** No. 1, 4-11, bibl. 26. [Dep. Bot., Univ. Bristol]

The results obtained are discussed in relation to the metabolic changes occurring during the germination of the barley grains.—M.P.

377 EUNUS, A. M. **The effects of X-rays on the embryonal growth and development of *Hordeum vulgare* L.** *J. exp. Bot.* 1955, **6,** No. 18, 409-21, bibl. 13, illus. [Dep. Bot., Michigan State Coll., E. Lansing]

378 JACOBSON, L. **Carbon dioxide fixation and ion absorption in barley roots.** *Pl. Physiol.* 1955, **30,** No. 3, 264-9, bibl. 18. [Univ. California, Berkeley]

379 STRZEMSKA, J. Zagadnienie mykorizy u zbóż. Cz. 4. Jęczmień. **The mycorrhiza of cereal plants. Part 4. Barley.** *Acta microbiol. Polon.* 1955, **4,** No. 3, 183-9, bibl. 3, illus., English summary p. 189.

A study was made of the occurrence and development of barley mycorrhiza in relation to soil type and pH. The barley roots examined were of plants grown on podzol, loess, black-earth, rendzina and alluvial soils, samples being taken (1) at sprouting, (2) during earing, and (3) at full maturity. The intensity of mycorrhiza development is independent of the kind and pH of soil. The form of the cells and the shape of barley roots are not influenced by the presence of a mycorrhizal fungus. The roots of barley are more often infected than the roots of other cereal plants, but the intensity of mycelial growth in barley is much less than in wheat and oats. The fungus infecting barley roots is similar to that observed in the roots of rye and wheat.—From author's summary.

380 KRALL, A. R. **Short-time fixation of labelled carbon dioxide by barley leaves under steady state conditions.** *Pl. Physiol.* 1955, **30,** No. 3, 269-71, bibl. 3, illus. [Univ. Wisconsin, Madison 6, USA]

381 SINGH, M. M. **Epidermal characteristics of plants in relation to drought resistance.** *Curr. Sci.* 1955, **24,** No. 7, 240-1, bibl. 6. [B.R. Coll., Agra]

Tabulated information is given on the number and dimensions of the stomata and epidermal cells observed in seedling and flag leaves of barley and wheat. Barley was characterized by higher frequency but smaller size of stomata and epidermal cells and higher stomatal index as compared with wheat. The inherently superior drought resistance of barley observed by the author may be due to these epidermal characteristics, which create a suitable environment for physiological adjustment under the stress of drought.—G.M.R.

382 DEGUCHI, M. and OHTA, Y. **Studies on influence of temperature and aeration of water culture solution on metabolism, growth and yields of crops.** *J. Sci. Soil, Tokyo,* 1955, **26,** No. 4, 148-54, bibl. 9, English summary p. 154. [Agric. Fac., Tokyo Univ. Education]

In experiments with barley plants grown in nutrient solutions, the solutions were aerated either by lowering the surface of water culture, or by adding H_2O_2. Both methods increased barley growth and nutrient uptake, though the first method was the more effective. The most effective treatment was to lower the surface of the nutrient solution by 3-4 cm. from early March onwards. Burying the pots in which the plants were grown, in soil so as to keep the culture temperatures the same as the soil temperature did not increase growth.—P.J.B.

383 Lal, K. N. and Subba Rao, M. S. **Deficiency and toxicity effects of boron on the physiology of barley.** *Curr. Sci.* 1955, **24,** No. 10, 345-6, bibl. 4. [Banaras Hindu Univ., India]

Data are given of the physiological responses of barley plants grown in substrates containing an absolute deficiency of B, a normal dose, and 5 times the normal dose. B-deficiency and B-toxicity symptoms are described.—P.J.B.

384 Atkins, R. E. and others. **Plant nutrition effects. Effects of nitrogen and phosphorus fertilizer on yield and malting quality of barley.** *J. agric. fd Chem.* 1955, **3,** No. 7, 609-15, bibl. 17. [Iowa State Coll., Ames]

The trials reported were carried out in Iowa during 1948-50. Manurial treatments used were tested in a 3 × 3 NP factorial experiment. N rates used were nil, 20 and 40 lb. per ac. and P treatments were nil, 40 and 80 lb. P_2O_5 per ac. Varieties used were Mars, Moore, Kindred and Wisconsin 38 in 1948 ; in 1950, Moore, only, was used. Grain yields showed a highly significant response to both N and P in all 3 years. The N × P interaction was significant (5% level) in 1948, only. The yield response of all varieties to manurial treatment was essentially similar. N treatments significantly increased barley- and malt-protein contents (from 14 to 16% and from 14·2 to 15·9%, respectively, in 1948). P treatments significantly increased bushel weight, 1000-grain weight and P content of the grain. Manurial treatments which resulted in high yield increases did not materially alter malting quality, but where such alterations occurred, they were of a beneficial character. N treatments in excess of those needed for maximum grain yields resulted in undesirable increases in protein content and a reduction in malt extract. The general effect of P treatments was to improve malting quality, particularly by increasing 1000-grain weight and malt extract, and had no adverse effects on any criterion of malting quality.—P.J.B.

MAIZE

385 Rattray, A. **Report on a visit to the United States, June to September, 1954.** *Rhod. agric. J.* 1955, **52,** No. 5, 426-55.

An account is given of maize cultivation in the USA and a comparison made with conditions in Rhodesia. Aspects considered include hybrid-seed production, seed certification, maize breeding, rotations and soil fertility, populations and spacings for maize. The author summarizes the ways in which he believes the breeding and production of hybrids in Rhodesia can be improved. Brief comments are also made on soyabean, sweet-corn, popcorn, lucerne, birdsfoot trefoil and sorghum cultivation in the USA.—M.P.

386 Grassi, U. La coltivazione del granoturco in Egitto. [**Maize cultivation in Egypt.**] *Riv. Agric. subtrop.* 1955, **49,** No. 10-12, 297-304.

Information is given on maize-growing in Egypt, where conditions are particularly favourable for this crop. Maize is mainly grown in northern and middle Egypt, the principal area of cultivation being the Nile Delta. It is mostly grown under irrigation in the "nili" period (end of July/beginning of August to November), the average yield being 2000 kg. per ha. The varieties grown belong to the 2 groups *Zea mays indentata* and *Z. mays indurata.*—E.B.O.

387 Rosado E., H. El cultivo del maíz y la producción de híbridos. [**Maize cultivation and hybrid production (in Mexico).**] *Publ. Dir. Agric. Ganad., Mexico* 1953, pp. 53. [Received Oct., 1955]

388 Novikov, A. E. [**Experiments on the growing of maize under conditions of the far north.**] [Russian] *Zemledelie* (*Agriculture*) 1955, **3,** No. 9, 13-14.

The necessary cultural measures for obtaining satisfactory crops of maize in the Archangel Province and in the Komi Autonomous Republic are outlined.—M.H.

389 Celykovskiĭ, P. G. [**Growing maize in the Baškir Autonomous Republic.**] [Russian] *Zemledelie* (*Agriculture*) 1955, **3,** No. 9, 15-16.

During the last 20 years in Baškir [approx. 55°E. long., 55°N. lat.] a considerable area has been sown under early varieties of *Zea mays* by the Baškir State Selection Station, 2800-3000 kg. of ripe grain being obtained per hectare. In 1954 the variety Liming gave a green harvest of 69,600 kg./ha. and the variety Partizanka produced a harvest of 89,300 kg./ha. (which included 8100 kg. milk-ripe cobs). The cobs are utilized on the collective farms for pig feeding. There is detailed information on cultural measures necessary for successful production of maize in the Republic. —M.H.

390† Fursa, N. T. and others. [**The growing of maize in the Kulundinsk Steppe.**] [Russian] *Zemledelie* (*Agriculture*) 1955, **3,** No. 12, 22-6. [Slavgorod State Breed. Sta.]

The Kulundinsk Steppe lies approx. 53° N. lat., 80° E. long. [see *Fld Crop Abstr.* 6 : 1512 for description of the climate]. An account is given of the cultural measures adopted on the Kulundinsk collective farms which have proved satisfactory for producing high yields of green maize feed. The total harvests obtained in 1954 (wet year) and 1955 (dry year) from different varieties of maize range

from 76,200 kg./ha. in 1954 for the Gruševskaja var. to 7000 kg./ha. in 1955 for Slavgorodskaja 270. —M.H.

391† Skljadnev, N. V. and Egorov, V. F. [**Maize in the northern forest/steppe of Siberia.**] [Russian] *Zemledelie* (*Agriculture*) 1955, **3,** No. 12, 33-4.

392† Kuzjmenko, F. K. [**803 centners (=80,300 kg.) per hectare of green weight from maize in Yakut.**] [Russian] *Zemledelie* (*Agriculture*) 1955, **3,** No. 12, 109.

393† Pljusnin, A. T. and Orobčenko, V. P. [**Growing maize in the Zitomir Province.**] [Russian] *Zemledelie* (*Agriculture*) 1955, **3,** No. 12, 30-2.

394 Pendleton, J. W. and Dungan, G. H. **The influence of time of thinning corn and the number of plants removed on the grain yield of the remaining plants.** *Agron. J.* 1955, **47,** No. 7, 325-6, bibl. 2. [Illinois Agric. Exp. Sta.]

The use of small plots or a limited number of plants in maize experiments requires that a perfect stand should be obtained. Sowing thickly and later thinning is common practice. The influence of number of maize plants removed per hill, and the height of the plants at the time of removal, on the grain yield of the remaining plants is shown graphically. The loss of grain yield resulting from the removal of plants from individual hills of maize increased as the number of plants removed per hill increased from 1 to 4 and as the plant height at time of thinning increased. This loss was attributed to the nutrients removed by the thinned plants, and not to the mechanical disturbance to the root systems of the remaining plants. The maize plant should approach knee-height before thinning and should then be jerked sideways to break it at about ground level and below the growing point.—P.M.G.

395 Ham, G. F. and Willard, C. J. **Herbicides apparently do not speed corn drying.** *Ohio Fm Home Res.* 1955, **40,** No. 296, 79.

A brief report is given of trials in which PCP and DNOSBP, both at rates of 4 lb. active ingredient in 80 gal. kerosene per ac., were applied to maize to hasten ear drying. The maize stalks were either left standing after treatment, or cut and laid on waterproof paper. In only one case was there a difference of more than 2% less moisture content in the treated than in the untreated ears as determined at 4 different sampling dates over the period 13 Sept.—11 Oct. after treatment. It was concluded that herbicidal treatment for hastening maize-ear drying was not sufficiently effective to be of any practical value.—P.J.B.

396 Dungan, G. H. and others. **The benefit of sowing maize for fodder in north and south lines.** *Allahabad Fmr* 1955, **29,** No. 1, 8-13. [Allahabad Agric. Inst.]

In 1954, a field trial was carried out to compare maize sown in north-to-south drills with that sown on east-to-west drills. The drills were 2 ft. apart and the plants approximately 7·4 in. apart in the drills, the plant population per acre being about 35,000. The superiority of the north-to-south sowings was shown in: an increase in the yield of ears (13·8%); an increase in fodder yield (21%); an increase in the amount of grain produced per plant (average 17%); and in the height of the plants at harvest. The superiority is attributed to the better exposure of the plants to sunlight.—G.M.R.

397† Jungehülsing, H. Silomais in Nordwestdeutschland. [**Silo maize in north-west Germany.**] *Dtsch. landw. Pr.* 1955, **78,** No. 21, 299-300, bibl. 2, illus. [Univ. Kiel, W. Germany]

The point is first made that silage maize is not a fodder maize which is ensiled but a grain maize harvested when the grain has reached the paste stage, i.e. before it is quite ripe. For north-west Germany, an early or medium-early grain maize, preferably a hybrid, should be grown and, for this region, the best hybrids are: the Dutch CB 32, CIV 2 and 6, Caldera 401, 402 and 821 and Goudster; the American Pioneer 396 and Wisconsin 240; the Danish KC 3 and KF 5. The crop should be sown from the end of April to early May (when the danger from frosts is past), at a rate of 18-24 kg./ha., drilled in rows 1 m. apart. This rate and spacing should produce 7-9 plants per m^2. without the labour of thinning. The crop should be harvested from early- to mid-October when the grain has reached the paste stage. Silage made from maize having a large proportion of cobs is a valuable and tasty fodder; it could replace fodder-beet which requires 4 to 5 times as much labour.—D.B.

398† Geroev, M. Ja. [**Maize in the north-east regions of Baškir.**] [Russian] *Zemledelie* (*Agriculture*) 1955, **3,** No. 12, 27-9. [Duvansk District]

In the collective farms of the north-eastern Baškir, [approx. 55° N. lat., 55° E. long.] the maize sowings are of late-ripening varieties (of unknown origin) obtained from the southern provinces of the Ukraine, Moldavian SSR and from Rumania. The crops resulting from such seed develop slowly in Baškir and produce only green material, in quantities reaching 35,000 kg./ha. With the object of obtaining seed from these sowings, work has been in progress to determine the most suitable cultural measures for the following varieties: (a) the early-ripening Čišminskaja 1 and Slavgorodskaja 270;

(b) the medium-early Voronežskaja 76 and Harjkovskaja 23 ; and (c) the late varieties Sterling, Minnesota 13, Krasnodarskiĭ 1/49, Liming Kubanskiĭ, Kubanec and Partizanka. The data show that Čišminskaja 1 (giving 66·5% ripe cobs after 108 days from sowing) and Voronežskaja 76 (ripening 11 days later) are the most suitable varieties for north-east Baškir.—M.H.

399 MAUPAS, A. Le désherbage chimique des cultures de maïs-grain complément des façons d'entretien (Béarn). **The chemical weeding of grain-maize crops complementary to cultivations (at Bearn).**] *C.R. Acad. Agric. Fr.* 1955, **41,** No. 11, 520-5, bibl. 12.

Practical recommendations for the use of certain herbicides, in particular ammonium dinitrophenate, 2,4-D and its derivatives, in maize are given, with references to the value and effect of the substances, on weeds and maize plants.—M.P.

400 SACCAS, A. M. La rouille américaine du mais (*Zea mays* L.) due à *Puccinia polysora* Underw. au Cameroun et en Afrique Équatoriale Française. [**The American rust of maize (*Zea mays*), caused by *P. polysora*, in the Cameroons and French Equatorial Africa.**] *Agron. trop., Nogent* 1955, **10,** No. 4, 499-522, bibl. 20, illus., English and Spanish summaries pp. 520-2. [Sta. Cent. Boukoko, Afr. Eq. Fr.]

The principal control measures recommended are : burning the maize residues after harvest ; practising a rotation of crops ; sowing early, at the beginning of the wet season ; applying organic and chemical fertilizers ; disinfecting the seed by steeping it in a solution of 1% copper sulphate for 30-60 min., or 0·5% Formol for 30 min. Studies are in progress to find resistant maize varieties. Although the variety Yangambi (120-days type) is attacked by *P. polysora*, it is reported to yield well when sown on rich soils at the beginning of the wet season.—E.B.O.

401 WEST AFRICAN MAIZE RUST RESEARCH UNIT. **First Annual Report, 1953.** Ibadan 1954, pp. 48, bibl. in text, illus. [Received Dec., 1955]

INVESTIGATIONS REPORTED :

1. Sources of resistance to the maize rust, *Puccinia polysora*. By W. R. Stanton and R. H. Cammack, pp. 10-15. [See *Fld Crop Abstr.* 7 : 70.]

2. Observations on *P. polysora* in West Africa. By R. H. Cammack, pp. 16-31. A rust assay in Nigeria and the Gold Coast, in 1953, showed the disease to be most intense in the coastal rain forest areas and to decrease in intensity northwards. Early crops gave high yields, those of later crops fell sharply. With early sowing of the maize the time of onset of the rust was late, but its spread on the host was rapid, whereas on the later sown crops onset of the disease became earlier and its spread slower. In the Cameroons the altitude barrier for *Puccinia polysora* was shown to be between 4000 and 7000 ft. a.s.l.

3. Factors affecting the yield of maize in West Africa. By W. R. Stanton, pp. 32-7. The relationships between rust resistance, plant height, time to maturity and yield were studied. Results indicate optimum plant heights to be 2·6-2·8 m. for maize grown at Ibadan.—M.P.

402 GORTER, G. J. M. A. **Prevention of maize diseases.** *Fmg in S. Afr.* 1955, **30,** No. 355, 424-9, illus.

The occurrence and symptoms of leaf- and ear-diseases of maize in South Africa are outlined. Control measures are recommended, where possible. —M.P.

403 HARPER, J. **The influence of the environment on seed and seedling mortality. 6. The effects of the interaction of soil moisture content and temperature on the mortality of maize grains.** *Ann. appl. Biol.* 1955, **43,** No. 4, 696-708, bibl. 12, illus. [Dep. Agric., Univ. Oxford]

Maize grains were exposed to 16-20 combinations of soil moisture and soil temperature (1-30°C.) for varying periods of time. Grains germinated readily in the wettest soils at 30 and 20° C., but germination was inhibited at the lower levels of soil moisture, and inhibited or delayed at the lower temperatures. Grains which failed to germinate in the soil were transferred to damp sand at 20° C. and the residual viability of the samples was determined. Mortality of grain was highest at combinations of temperature and soil moisture which just did not allow of germination. Soil conditions even more unfavourable for germination gave greater residual viability in the samples. The viability of dormant grains was more rapidly destroyed at high than at low temperatures although the reduction in viability continued longer at low temperatures, probably because of the slower drying of the soil. This mortality is interpreted in terms of pathogenic activity, and it is shown that mortality at high temperatures (20-35° C.) is explicable on this general hypothesis. It is tentatively suggested that temperature and soil moisture conditions interact in selecting out and favouring the activity of specific populations of pathogens in the soil. [See also *Fld Crop Abstr.* 7 : 807.]—Author's summary.

404† HENKELJ, P. A. and others. [**The effect on development and ripening of subjecting maize seed to fluctuating temperature.**] *Fiziol. Rast.* (*Pl. Physiol., USSR*) 1955,

2, No. 5, 447-53, bibl. 12, illus. [Bot. Dep. Moscow Pedagogic Inst.]

The authors' experiments were made in an attempt to condition the maize crop (grown for silage) to cold in order to obtain maize seed for sowing silage crops under the conditions existing in the Moscow Province. In 1954, experiments were started at the above Institute with seed of the var. Rjadovaja at the initial stage of germination. Square-pocket sowings (70 × 70 cm.) were made on an area of 337 m². In each pocket 4 seeds were placed (later thinned to 1 plant per pocket) at a depth of 7-8 cm. Variants of the test were : (1) control (dry seed) ; (2) seed soaked (50% water/air-dry wt. of seed) for 1 day then stored on ice (0-1°C.) for 3 weeks ; (3) seed soaked for 1 day (35% water/air-dry seed wt.) and then kept for 3 weeks, alternately half-a-day on ice and half-a-day at room temperature (18-20°C.). Sowing was on 25 May. There is a discussion of the data in relation to viscosity of protoplasm/plant growth stage/low temperatures. The records show that (3) had the greatest effect on germination, the total ripe grain obtained being 65·8% above that of (1) ; while (2) resulted in 31% more ripe grain than (1). It is concluded that treatment (3) induced hardiness of the crop under field conditions and therefore sowings with seed so treated can be made earlier than normal.—M.H.

405 VARENIK, I. P. [**The overwintering in the soil of maize grain.**] [Russian] *Priroda, Moskva* (*Nature, Moscow*) 1955, **44,** No. 11, 116-17, illus. [Krasnodar]

In the spring of 1954, the author observed in the Krasnodar area plants of the *Zea mays* variety Stirling, seed of which had overwintered in the soil without detriment to the seedlings. In the autumn of 1953, after harvesting the cobs from the maize crop of that year, the stems and leaves were eaten down by cattle. Then the stubble, with sporadic cobs, was ploughed in to a depth of 22 cm. On 21 November, 1953, a frost of −21° occurred, without a snow cover, and the soil froze to a depth of 15 cm. In December, snow fell (20-50 cm. thick) and remained on the ground until the middle of March, 1954. In April, the first tilling operations uncovered some maize cobs (enveloped in decomposed leaves) with sprouting grain which developed into vigorous seedlings by the end of April. Some of these plants later produced one or two cobs, but only in the unthinned specimens which grew densely from a pocket were the seeds undeveloped. The author is studying the possibility of selecting from this material a maize type which is resistant to cold.—M.H.

406 ROCA, J. Formación de prótidos en el proceso de germinación del maíz. 1. [**Formation of nitrogenous substances in the process of germination of maize. 1.**] *An. Inst. Biol., Méx.* 1955, **26,** No. 1, 11-17, bibl. 18.

It was found that the quantity of amino-nitrogen in maize seed almost doubled itself at the third day from germination ; it increased until the eighth day, and decreased gradually thereafter. The increase in amino-nitrogen was related to protease activity.—E.B.O.

407 DUVICK, D. N. **Cytoplasmic inclusions of the developing and mature maize endosperm.** *Amer. J. Bot.* 1955, **42,** No. 8, 717-25, bibl. 26, illus. [Pioneer Hi-bred Corn Company, Johnston, Iowa]

The paper is concerned with the origin and development of starch grains in the endosperm.—D.B.

408 SELTMANN, H. **Comparative physiology of green and albino corn seedlings.** *Pl. Physiol.* 1955, **30,** No. 3, 258-63, bibl. 19, illus. [Univ. Chicago, Illinois, USA]

A time-course study was made of the distribution of various N fractions (total, protein, soluble, asparagine, glutamine, α-amino and ammonium) in green and albino maize seedlings grown in light and in darkness. The results confirm earlier findings that albino maize seedlings have a higher soluble-N and a lower protein-N content than green seedlings have, and that proteolysis occurs in the albino corn seedling. The ammonium-N content was the same in both green and albino seedlings but increased in the latter after 12 days' growth. In a respiration study, it was found that O uptake per gram dry weight was 20-30% higher in the albino than in the green tissue. The O uptake of light-grown albino tissues is modified by a cyanide-insensitive enzyme system which is present when the tissues receive 24 hr. of light.—D.B.

409 KANDLER, O. and FINK, E. Über den Einfluss von 2,3,5-trijodbenzoësaüre auf den Stoffwechsel *in vitro* kultivierter Maiswurzeln. [**On the effect of 2,3,5-tri-iodobenzoic acid on the metabolism of maize roots grown *in vitro*.**] *Flora, Jena* 1955, **142,** No. 2, 295-306, bibl. 23. [Bot. Inst., Univ. Munich, W. Germany]

410 HONERT, T. H. van den, and HOOYMANS, J. J. M. **On the absorption of nitrate by maize in water culture.** *Acta bot. néerl.* 1955, **4,** No. 3, 376-84, bibl. 18. [Bot. Lab., Univ. Leiden, Neth.]

411 DULAC, J. Diagnostic foliare des céréales. 3. Applications de la relation azote-rendement au maïs. 4. Relations entre la " teneur en azote " de la feuille de l'épi, le " rendement hectare " , le " rendement par pied " et la " densité " chez le maïs.

[**Foliar diagnosis of cereals. 3. Applications of the nitrogen-yield relationship to maize. 4. Relationships between the "nitrogen content" of the spathe leaf, the "yield per hectare", the "yield per plant" and the "density" in maize.**] *C.R. Acad. Agric. Fr.* 1955, **41,** No. 11, 500-7, bibl. 3, illus.

[See also *Fld Crop Abstr.* 8 : 1190.] From the determination of the nitrogen content of the spathe leaf and the yield of maize grown under different conditions it was found that the nitrogen-yield relationship held for hybrid maize and that the optimum plant density lay around 45,000 plants per ha. Individual results which deviated from the expected value were seen to act as indicators of an excess or a deficiency of N in the soil which caused a corresponding variation in the yield. The N content of the spathes of local, open-pollinated varieties was unexpectedly higher in proportion to the yield than that of the hybrids, until a correction of approximately 25% was applied to the N-content values (to allow for the 22-28% economy of N in the tissues of hybrid maize compared with the open-pollinated varieties), when the corrected values corresponded to the expected values. The N-content of the spathe leaf of maize was sensitive to changes in plant density and N-availability. Similarly, yield per plant and yield per ha. were related to density, under normal conditions of growth. The results obtained stress the importance of N, within limits, as a factor in maize yields, and the importance of finding a plant density suited to the fertility and climate of the region.—M.P.

412 DONOVAN, P. A. **Progress Report on field crop experiments 1950/51-1953/54.** [**Gwebi College of Agriculture.**] *Rhod. agric. J.* 1955, **52,** No. 2, 121-31, illus.

In fertilizer experiments with maize, the application of 3 tons of compost per ac. per annum, whether applied annually or every second or fourth year, was similar, in its effect on the following maize yields, to a green manure crop every third year. Where maize followed maize in the rotation, ploughing in of the fertilizer gave the best results; placement and broadcasting (followed by discing-in) were equally effective. Maize after green manure responded similarly to the fertilizer when placed or broadcast. In a maize variety trial, the Double Hybrid 52 DH 59 was top-yielder with 73·53 bags per ac. [1 bag = 200 lb.], Hickory King was lowest-yielder. Results of a time of sowing, plant population and fertilizer rates trial with maize, indicate that early planting (November) at a population of approximately 15,000 plants per ac. may be considered the optimum on the College Farm. Fertilizers always increased yields.—M.P.

413 FFITCH, B. J. **Maize harvesting in Southern Rhodesia.** *Rhod. agric. J.* 1955, **52,** 97-110, bibl. 9.

Consideration is given to the methods and machinery used in harvesting maize.—M.P.

414 FOSTER, G. H. **Grain storage. Effects on corn** [**maize**] **of storage in airtight bins.** *J. agric. fd Chem.* 1955, **3,** No. 8, 682-6, bibl. 7, illus. [U.S. Agric. Mktng Serv., Lafayette, Indiana]

SWEET-CORN

415 JANES, B. E. **Vegetable rotation studies in Connecticut. 3. Effect of sweet corn and vetch on the growth of several crops which follow.** *Proc. Amer. Soc. hort. Sci.* 1955, **65,** 324-30, bibl. 5. [Univ. Connecticut, Storrs]

In trials during 1953-4, vegetable crops were sown in spring, following autumn-sown winter cover crops of vetch or rye, or after fallow during the winter. Crops grown during the previous season included sweet-corn. Lettuce and onions grown during the season after sweet-corn were stunted, owing to root injury. Beet plants were initially retarded in growth, but recovered and made normal growth. Fewer weeds germinated on plots previously under sweet-corn or vetch and those which germinated grew slowly. Where vetch had been grown, weed growth showed a marked increase after early July. Beet yields after vetch were eventually higher than on plots fallowed during the previous winter. It was concluded that the decomposition of maize residues in the soil under relatively cool conditions resulted in the production of substances toxic to nearly all plant species and that these substances disappeared at the advent of relatively higher soil temperatures.—P.J.B.

416 WILSON, J. W. **Control of the corn earworm in Florida.** *J. econ. Ent.* 1955, **48,** No. 4, 442-4. [Cent. Fla Exp. Sta., Sanford]

Information is given on the control of the corn earworm [*Heliothis armigera*] on sweet-corn in Florida.—E.B.O.

SORGHUM AND MILLET

417 PITNER, J. B. and others. El cultivo del sorgo. [**Sorghum cultivation.**] *Foll. tec. 15. Sec. Agric. Ganad., Mex.* 1955, pp. 50, bibl. 7, illus., English summary p. 50.

Sorghum cultivation shows great promise in those regions of Mexico which are situated below 1900 m.a.s.l. and are too dry for growing maize. More than 200 varieties of sorghum, mainly for grain, were tested in different districts of Mexico in

1950-3. From this material many high-yielding varieties were selected and released to farmers. The best varieties for grain, which are described, were : Dwarf Milo, Early Hegari, Kafir 1, Kafir 2C, Redbine 1, Redbine 2, Redbine 3, Caprock and Shallumex 1. The best varieties for fodder were : Honey, Sourless, Hi Hegari, Sumac, Leoti, Rancher and Atlas ; and the best for broom-fibre production : Scarborough, Fulltip, Black Spanish, Acme, Dwarf Broomcorn and Evergreen.—E.B.O.

418 KARPER, R. E. **Registration of sorghum varieties. 8.** *Agron. J.* 1955, **47,** No. 11, 540, bibl. 1. [Fld Crops Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

The variety Tracy [*Sorghum vulgare*] (Reg. No. 106), is described. It is a mid-season sorgo variety for syrup production, and is adapted to Mississippi. It matures in about 100 days, is resistant to lodging and has erect stalks of medium diameter.—P.J.B.

419 NARAYANASWAMI, S. **The structure and development of the caryopsis in some Indian millets. 4. *Echinochloa frumentacea* Link.** *Phytomorphology* 1955, **5,** No. 2 and 3, 161-71, bibl. 20, illus. [Bot. Dep., Univ. Delhi, India]

420 NARAYANASWAMI, S. **The structure and development of the caryopsis in some Indian millets. 5. *Eleusine coracana* Gaertn.** *Pap. Mich. Acad. Sci.* 1955, **40,** Pt. 1, 33-46, bibl. 34, illus. [Univ. Delhi, India]

The floral structure of *E. coracana* is described. The embryogeny and the distribution of the vascular supply is traced in detail and the structure of the mature embryo is studied.—From author's summary.

RICE

421 ANGLADETTE, A. La riziculture espagnole. [**Rice cultivation in Spain.**] *Riz et Rizicult.* 1955, **1,** No. 2, 58-68.

422 CHANDRARATNA, M. F. **Rice in California.** *Trop. Agriculturist,* 1955, **111,** No. 2, 125-8.

A visit to the Biggs Rice Experiment Station, which undertakes an extensive breeding and cultural programme, and the rice-growing areas of California is reported. The history of the industry, rice varieties, rotations, tillage, seeding, fertilizer practice and weed control are treated. The Sacramento rice crops are considered among the cleanest anywhere. Damage from cold-water irrigation (below 70°F.) was the only grave crop hazard observed.—P.M.G.

423 ARNOUX, — Aménagement hydraulique des rizières et développement des moyens de culture dans le Haut-Niger. [**Water management of rice-fields and the development of cultural methods in the Upper Niger.**] *Riz et Rizicult.* 1955, **1,** No. 2, 55-7.

424 PAUQUET, E. La culture du riz en région Itimbiri. [**Rice cultivation in the Itimbiri region (Belgian Congo).**] *Bull. agric. Congo belge* 1955, **46,** No. 5, 985-1016, bibl. 4, illus.

Information is given on the cultivation, production, milling and marketing of rice in the Itimbiri region, where hill rice is grown. Rice cultivation was introduced into this region about 1920. Of the 90,137 metric tons of rice marketed by the natives of the Belgian Congo in 1949, 10,366 tons came from the Itimbiri region.—E.B.O.

425 MORIMOTO, I. **On the records of paddy rice yield from 1865 to 1948 by a farmer, Akio Mizushima, in Okayama Prefecture.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 268-9, English summary. [Hyogo Agric. Coll.]

Records of rice yields kept by a family from 1865 onwards show them to have been considerably higher than the average for Japan as a whole and also to have been steadily improved year by year.—From author's summary.

426 NAGATO, K. and others. **Observations on damage to rice crops caused by wind storm.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 265, English summary. [Univ. Nagoya]

A plot sheltered by a windbreak suffered no damage, but in an exposed plot two rice varieties suffered in different degree. In one variety the plants affected were entirely lodged and for a few days the translocation of nutrients into the kernels was greatly checked, only the more vigorous grains maturing normally, so that the yield of rice was only 70% of that of the undamaged plot. In the other variety, the leaves were split into two or three parts and the hulls were slightly chafed, resulting in imperfect kernel development and rice yield 10% lower than that of the sheltered plot.—From authors' summary.

427 RICE JOURNAL. **New medium-grain [rice] variety developed.** *Rice J.* 1955, **58,** No. 12, 14, illus.

Nato is an early, medium-grain variety, selected from a Rexoro-Purple leaf × Magnolia cross and is adapted for production throughout the southern rice zone of the USA. Nato is 2-5 in. shorter than Zenith and 2-8 in. shorter than Magnolia and has outyielded both these varieties in trials in Louisiana. —P.J.B.

428 JODON, N. E. **Toro and Sunbonnet. Two new midseason, long-grain rice varieties compared.** *Rice J.* 1955, **58,** No. 13, 8-11. [Fld Crops Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

Toro and Sunbonnet were released in 1953 and '55, respectively. Sunbonnet was selected from one of several strains found in the original seed stock of Bluebonnet. Grain yields of Sunbonnet have been very similar to those of Bluebonnet, but the grain is shorter and more uniform in length, less chalky and head yields of rice have been higher. Toro was selected from a cross Bluebonnet × Sel. 4-II-8-14. It is about 4 in. shorter than Sunbonnet. Grain yields of Toro have been slightly higher than those of Bluebonnet and head rice percentages have been very high.—P.J.B.

429 TINARELLI, A. Classificazione delle razze di riso coltivate in Italia. [**Classification of rice varieties grown in Italy.**] *Riso* 1955, **4,** No. 8, 12-18, illus., English and French summaries p. 18.

A commercial classification is given of the rice varieties grown in Italy based on the length of the caryopsis which is the character showing the least variability of those considered. Other characters given for each variety are: unhusked grain: length, width, and 1000-grain weight; caryopsis: width and 1000-grain weight.—E.B.O.

430 PANDYA, P. S. **A review of rice research in Bombay State.** *Rice News Teller* **3,** No. 3, 143-54. [Stat. Officer, Dep. Agric. Poona, Bombay]

The account includes a short description of improved strains of rice evolved by selection.—G.M.R.

431 INDIAN FARMING. **Improved paddy varieties for Gujarat.** *Indian Fmg* 1955, **5,** No. 8, 28-9.

The quantitative and qualitative agronomic characters of improved strains of rice evolved at 3 stations are tabulated. The best spacing at Bulsar was found to be 6 in. by 6 in. with 8 seedlings per bunch, while at Nawagam for both the Sukhvel and Jirasal varieties 6 in. by 6 in. with one seedling per bunch was found suitable.—P.M.G.

432 RAJAGOPALAN, K. **A preliminary note on the study of inter-racial hybrids in rice.** *Madras agric. J.* 1955, **42,** No. 5, 177-8, bibl. 5. [Agric. Res. Inst., Coimbatore]

Important attributes recorded in hybrids of *Oryza sativa* forma *indica* and *O. sativa* forma *japonica* are productive tillers and spikelet fertility.—G.M.R.

433 GEORTAY, G. Variétés de riz diffusées par l'INÉAC. [**Rice varieties distributed by INEAC.**] *Bull. Inform. INÉAC* 1955, **4,** No. 5, 309-18, illus.

Rice cultivation is extending rapidly in the Belgian Congo. In 1952, the rice area was about 161,600 ha. and the production 169,645 metric tons. It is thought that the target of 250,000 tons may be reached in 1959. Information is given on the improved rice varieties issued by INÉAC, the distribution of which started in 1936 with Y 3. This variety was later replaced by Rz 111, which has resulted in improved rice yields since 1949 when the average yield per ha. was 1000 kg., compared with 600-700 kg. in previous years. About 450 metric tons of seed of the variety M.L.E. were distributed in 1951-5. The distribution of R 66 has also begun. R 67, tested in comparative trials, is promising.—E.B.O.

434 DORE, J. **Dormancy and viability of padi seed.** *Malay. agric. J.* 1955, **38,** No. 3, 163-73, bibl. 12.

Results from weekly germination tests with seed of 21 rice varieties from different regions of Malaya showed that the dormancy period of freshly harvested seed was 7-11 weeks with the exception of Pebifun, the only non-photosensitive variety tested, which had a dormancy period of 5 weeks. In a 4-year storage experiment, the seeds of 6 rice varieties were stored under 3 different conditions: (a) in paper bags in a laboratory at relative humidities fluctuating from 50% during the day to 80% during the night; (b) in sealed bottles with anhydrous calcium chloride (at about 0% R.H.), in the laboratory; (c) in an air-conditioned room at about 55% R.H. and at 68°-78°F. These temperatures were about 10°F. lower than in the laboratory. The seeds in paper bags lost their viability within 15 months; in the sealed containers they remained viable up to 2 years and in the air-conditioned room up to 3·5 years.—E.B.O.

435 HAQ, A. **Weed flora of paddy fields and its control in eastern Uttar Pradesh.** *Sci. and Cult.* **21,** No. 5, 277-8. [Rice Res. Sub-Sta., Gorakhpur]

A list of weeds infesting the paddy fields is given. Cultural practices, like thorough ploughing, sowing at the optimum time, puddling of germinated seeds and transplanting, rather than broadcasting, minimize the weed population.—P.M.G.

436 VACHHANI, M. V. and CHAUDHURY, M. S. **Selective herbicides for weed control.** *Rice News Teller* 1955, **3,** No. 3, 129-35, bibl. 4. [Cent. Rice Res. Inst., Cuttack]

Three commercial preparations were tested for the control of weeds in rice. Spraying 6 weeks after planting was found to be effective and to cause least injury to the main crop. Of the herbicides tested, phenoxylene-30 (MCPA) at the rate of two-thirds of a gallon per acre sprayed 6 weeks after planting was most effective and gave an increased

yield of 17·5%. It was not more costly than the customary hand weeding and gave a higher yield of approximately 8%.—From authors' summary.

437 KAMATA, E. **Relationship between iron-, manganese-, zinc- and copper-contents in rice plant and its resistance to wilting (*Piricularia oryzae*).** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 281-2, English summary. [Univ. Tokyo]

Variation in the iron, manganese, zinc and copper levels in the leaf of a susceptible variety of rice plant was found to be definitely related to the intensity of susceptibility. In general, a high concentration of these elements strengthens the plant's resistance. No connexion was found between susceptibility to wilt and the nitrogen, magnesium, calcium or silica levels in the plant.—Author's summary.

438 KITAMURA, E. **Studies on the abnormal development of rice plants grown on new lands or old lands uncropped to rice for several years.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 270-1, English summary. [Chugoku Agric. Exp. Sta.]

Various grades of abnormality in the development of rice panicles from the formation of primordia to seed completion were observed and were found to be due to the waterlogged condition of certain kinds of soil. The phenomenon is compared with straighthead of rice reported in the USA. The most effective method of prevention is to dry the paddy field for about 10 days just before the plant forms panicle primordia.—From author's summary.

439 CHALAM, G. V. **Anatomy of open and compact panicles in *Oryza sativa*.** *Curr. Sci.* 1955, **24,** No. 10, 349.

440 MISRA, G. **Photoperiodism in rice. 5. Response of 2 early-winter varieties to short-day photoperiods given after transplantation.** *J. Indian bot. Soc.* 1955, **34,** No. 1, 53-66, bibl. 23. [Bot. Dep., Ravenshaw Coll., Cuttack, India]

Strains used in these trials were T.36 and T.23. Sowings were made in pots on 26 June, 1949, and the plants were transplanted on 16 July. Controls received full natural day lengths, while the rest of the plants received 10 hr. day-lengths (8 a.m.-6 p.m.), starting when they were 30, 40, 50, 60, 70 and 80 days old and continuing until ear emergence, following which, natural day lengths were used up to harvest time. Short-day treatments made to T. 36 when 30 days old, reduced the time from sowing to emergence of the first panicle by 46·1 days, and by 29·9 days in T.23. With T.36, plants treated when 80 days old took 4·3 days less from sowing to panicle emergence than controls; T.23 plants similarly treated took 0·7 days longer from sowing to panicle emergence. Data are also given of the effect of short-day treatments on tillering, leaf numbers, plant height, grain yield and components of grain yield. It was concluded that T.36 was short-day-sensitive and that T.23 was moderately short-day-sensitive.—P.J.B.

441 MISRA, G. **Photoperiodism in rice. 6. Effect of long day length on three medium-early varieties of rice of Uttar Pradesh.** *J. Indian bot. Soc.* 1955, **34,** No. 1, 67-71, bibl. 15, illus. [Bot. Dep., Ravenshaw Coll., Cuttack, India]

Studies were made on the effect of continuous daylight treatment for 3, 4, 5 or 6 weeks on 3 medium-early rice varieties, T.3, T.12 and T.21, grown in pots. Treatment for 4, 5, or 6 weeks significantly delayed ear emergence in all varieties; treatment for 3 weeks did not result in a significant delay. Following treatment for 6 weeks, the ear emergence of T.3, T.12 and T.21 was delayed 6·3, 10·9 and 6·1 days, respectively. Treatment for 3, 4 and 5 weeks significantly increased ear yields over controls grown under natural day-lengths. Only in the case of T.12 did treatment for 6 weeks result in significant grain yield increases over controls. The effect of long day-lengths on grain yields was chiefly due to increased panicle length and increased percentage of kernels set per panicle.—P.J.B.

442 MISRA, G. and SAMANTARAI, B. **Effects of short photoperiods on a variety of early rice.** *Curr. Sci.* 1955, **24,** No. 7, 242-3, bibl. 4. [Ravenshaw Coll., Cuttack]

Fifteen-day-old seedlings of the early rice variety B.76 (Putia-Shankar) were exposed to 8-hour short-day treatment until the time of ear emergence, transplanting taking place during the period of treatment. The treated plants took a longer time for ear emergence, produced at all stages a smaller number of tillers and a greater number of leaves, and grew taller than the control plants. The inhibitory action on ear emergence resulted in a delay of 9 days in the main shoot, 11 days in the first tiller, and 18 days in the second tiller. The responses observed may be attributable to a greatly increased concentration of auxin due to short photoperiods.—G.M.R.

443 MATSUSHIMA, S. and others. **Crop-scientific studies on the yield-forecast of lowland rice. (Preliminary report.) 20. Tracing up developmental processes of young panicles on all individual tillers (1, 2).** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 274-5, English summary. [Nat. Inst. Agric. Sci.]

The developmental processes of young panicles in rice plants were traced on all the individual tillers

of 3 hills at 2-day intervals. These stages are listed in English. It was found that the early, middle and late stages of every developmental period of young panicles in a field as a whole can be identified externally by the morphological characteristics of the plant.—From authors' summary.

444 SATO, K. **Studies on the starch content in the tissues of rice plant. 1. Transformation of starch grains in the tissues with their development of growth.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 261-4, bibl. 10, illus., English summary. [Univ. Tohoku]

Starch accumulated in the tissue of the rice plant varied in amount according to the growth of the plant, and the size of the grains changed nearly in direct proportion to their amount. The process of transformation is described and illustrated.—From author's summary.

445 ARIKADO, H. **Studies on the development of the ventilating system in relation to tolerance against excess-moisture injury in various crop plants. 4. The ventilating pressure in the rice plant growing in paddy-field conditions.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 285-6, illus., English summary. [Univ. Mie]

Ventilating pressure was measured in potted plants of the lowland rice variety Norin 37 at 2-week intervals after transplanting. Pressure varied with the degree of expansion of stomatal openings and with the number of green leaves. Particularly important was the position on the stem where the lowest green leaf was attached. Specific differences in ventilating pressure between the main culm and tillers were discernible at the growth stages prior to heading, but they diminished towards maturity. Seasonal changes in pressure were clear, pressure being lowest at the stage of differentiation of ear-primordia. Transference of oxygen from the top to the roots is probable.—Author's summary.

446 TAMURA, T. **A new device for measuring the resisting power of rice seedlings against uprooting for transplantation and its application. (Preliminary report).** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **24,** No. 1, 1-3, illus., English summary p. 3.

447 FUJIWARA, A. and TSUTSUMI, M. **The deficiency symptom of microelements on rice plant.** *Soil Pl. Fd, Japan* 1955, **1,** No. 1, 41-2, bibl. 1. [Agric. Fac., Univ. Tohoku, Sendai, Japan]

448 NEGI, L. S. and SAINI, S. S. **Applying ammonium sulphate to rice in Kangra.** *Rice News Teller* 1955, **3,** No. 3, 136-42, bibl. 3. [Dep. Agric. Punjab]

About 25% of the total rice acreage of the Punjab is situated in the Kangra Hills, where the crop is sown on terraced slopes at an altitude of 1500-5000 ft. Heavy rainfall (up to 90 in.) during the growing season, and continuously flowing water in the paddy fields create favourable conditions for the loss of ammonium sulphate applied by the customary surface method. Trials were made from 1952 to 1954 of the following methods : (1) fertilizer placed 3 in. deep in dry soil just before flooding the field ; (2) fertilizer placed 3 in. deep 15 days after transplanting, in the form of pellets of ammonium sulphate and earth mixed in the ratio of 1 : 10 ; and (3) the customary method, the fertilizer being spread 15 days after transplanting with 3 in. water standing in the field. The average excess paddy yield over control (no fertilizer) was, in lb. per acre, (1) 511, (2) 353, (3) 188. Data compiled on the number of tillers per sq. ft. in the different treatments in 1952 showed the order of superiority to be the same in this respect also.—G.M.R.

449 ZALIKI, T. La fumure azotée du riz : azote ammoniacal et azote nitrique. [**The nitrogenous manuring of rice : ammoniacal nitrogen and nitric nitrogen.**] *Feuilles agric. Egypt* 1955, No. 86, pp. 7, bibl. 2.

Trials were carried out in different regions of Egypt to determine the comparative effect of ammonium sulphate and Chilean nitrate applied to rice at different dates. Results indicated that : (a) the best time for applying these fertilizers was about 65 days from sowing in the case of directly sown crops, and 90 days from sowing in the nursery in the case of transplanted crops ; (b) provided the fertilizers were applied at these dates, no differential effect on rice yield was noted between the two types of nitrogenous fertilizer.—E.B.O.

450 THOMPSON, J. H. and others. **Drying characteristics of western rice—Colusa 1600 variety.** *Rice J.* 1955, **58,** No. 11, 14-19 and 52, bibl. 3. [West. Util. Res. Br., Agric. Res. Serv., U.S. Dep. Agric., Albany 10, Calif.]

The data reported are intended to provide information on the drying characteristics of a western rice variety, for the use of drier operators, regardless of the type of drier used. A diagram is given showing the effect of drying-air temperature and number of passes on yield of whole grain and total drying time. Also given are diagrams showing how the total time required to dry rough rice from a moisture content of 23·6% down to 13% is distributed between the different passes for 3- and 5-pass drying.—P.J.B.

451 HOGAN, J. T. and KARON, M. L. **Hygroscopic equilibria of rough rice at elevated**

temperatures. *J. agric. fd Sci.* **3,** 1955, No. 10, 855-60, bibl. 17. [S. Reg. Res. Lab., New Orleans, La]

452 CENTRAL RICE RESEARCH INSTITUTE, CUTTACK. **Annual Report for 1952-53.** 1954, pp. 35.

INVESTIGATIONS REPORTED :

1. Crop sequence experiment. The inclusion of a groundnut crop in sequence with rice was found to benefit the rice, besides giving a good economic return.
2. Herbicides for weed control. A single spraying, 4 weeks after transplanting, of Phenoxylene 30, (MCPA) at two-thirds of a gallon per acre, or of Chloroxone (2,4-D) at 2 lb. per acre, was as effective as hand weeding.
3. Efficiency of different nitrogenous fertilizers for rice. Ammonium phosphate and ammonium sulphate gave the best results, followed by ammonium chloride and urea. With ammonium nitrate, the response was significantly lower than with ammonium phosphate.
4. Placement and application of ammonium sulphate in split doses. Sub-surface application, both in dry soil condition and as pellets, gave the best results under upland as well as lowland conditions. In this, sub-surface dry application before planting appeared to be best ; pellet application was best after planting. There is no advantage in split doses.
5. Susceptibility to drought in 10 rice varieties. Pot trials in which watering was stopped for 20 successive days at five different stages of growth showed that the plants could bear drought better in the earlier stages of growth. They were most susceptible during initiation of flower primordia and at the ear-emergence stage. Some varieties were more resistant than others.
6. Response of 20 Asian rice varieties to photoperiods of 10·5, 11·5, 12·5 hr. and to natural day-length.
7. Seed soaking in nutrient solutions. Pre-sowing treatment with a 10% solution of K_2HPO_4 in a field trial produced a significant increase in yield in the medium duration variety T.141 only.
8. Sub-surface placement of sulphate of ammonia fertilizer. A 12% increase in yield was obtained, as compared with a 6·5% increase given by surface application over control.
9. Micronutrients and rice. In spraying trials, the treatment of the early variety Co. 13 with $CuSO_4$ and $ZnSO_4$ gave a small but not significant increase in yield over the control. There was no increase from spraying with $MnSO_4$, borax, $MgSO_4$ or ammo. molybdate.
10. The application of lime to paddy soils at the rate of 2000 lb. per acre together with phosphate and nitrogen treatments gave an average yield increase of 12·8% over no lime, and the limed plots had a healthier appearance.—G.M.R.

GENERAL

453 KLITSCH, C. Der Saattermin der Winterungsarten. [**Sowing dates of overwintering species.**] *Dtsch. Landw.* 1955, **6,** No. 8, 369-75. [Friedrich-Schiller Univ., Jena, E. Germany]

Physiological explanations are given for the time limits within which rye, barley and wheat can be sown in Eastern Germany.—D.B.

454 DEPARTMENT OF AGRICULTURE REPUBLIC OF IRELAND. **Cereal variety trials at the Department's Schools, 1952.** *J. Dep. Agric. Republ. Ire.* 1953-54, **50,** 180-95. [Received Nov., 1955]

Results are given of replicated trials in regard to dates of sowing, ear-emergence, ripening, yields, bushel- and 1000-grain weights and field behaviour. In the spring-wheat trial, no variety showed an overall superiority, although Atle did uniformly well at all centres. Of the oat varieties, Glasnevin Triumph and S. 84 significantly outyielded Sun II. Stormont Iris was the lowest yielder. In the potato-oat trial at Ballyhaise, Scotch Potato, Potato (Ardee) and Q. 40 yielded similarly and significantly above Potato (N.S.). In one barley trial, Beorna and Herta outyielded Ymer, Bonus and Glasnevin, Beorna was the last to ripen. In a trial with malting varieties, Beorna and 2 selections from Beorna outyielded Spratt Archer. In a third trial with Beorna and three selections, Spratt Archer × Kenia 22/11 was top-yielder.—M.P.

455 ESTACIÓN EXPERIMENTAL DE AULA DEI. SPAIN. Departamento de mejora. Ensayos 1954 - 1955. [**Improvement Department. Trials in 1954-5.**] [n.d.], pp. 19.

Varietal trials with cereals were carried out in irrigated plots. Of the wheats, Florence-Aurore and Ariana yielded best with 1692 and 1689 kg. per ha., respectively. Of the barleys, Gogotona de Carcastillo gave the best yield, 10,210 kg. per ha. Of the oats, 0355 × Gopher and Gopher yielded best with 6380 and 6258 kg. per ha., respectively. —E.B.O.

456† LINDENBEIN, W. and BULAT, Helene. "Triebkraft", Ziegelgruswert und Tetrazoliumwert. [**Germinating energy, the "brickdust" value and tetrazolium value.**] *Saatgutwirtschaft* 1955, **7,** No. 11, 315-19, bibl. 11, illus. [Inst. Samenkunde, Landw. Hochsch., Stuttgart-Hohenheim, W. Germany]

The paper is largely a discussion of the many definitions used for the word "Triebkraft" [ger-

minating energy] which have been proposed by various authors. Figures obtained over many years for wheat, oats, barley and rye show a close agreement between values for germinating energy arrived at by allowing the seeds to grow through a constant depth of brickdust and that obtained by the tetrazolium method. This agreement applied to low as well as to high values for germinating energy. The advantage of the tetrazolium method is that it takes only 2 days whereas the brickdust method takes about a fortnight.—D.B.

457 WARNER, M. G. R. **The sampling of grain. 1 and 2.** *Agric. Merch.* 1955, **35,** No. 5, 200-3, No. 6, 266-9, illus.

The importance of accuracy in the sampling of grain is discussed. The methods of sampling grain in bulk or in sacks and the devices available for assisting the sampling process are described. The changes in moisture content of wheat held in various forms of grain-sample containers, tested under storage conditions over a period of time, are given. Containers which consisted entirely of metal, glass or polythene were very satisfactory. Polythene film bags 0·005 in. thick were satisfactory for 1-2 weeks under normal atmospheric conditions and appeared to withstand normal transit conditions.—M.P.

458 MACHACEK, J. E. and others. **A study of some seed-borne diseases of cereals in Canada. 3. Effect of rate of seeding, percentage of infested kernels, and weeds, on the yield of plots sown with treated and untreated seed.** *Canad. J. agric. Sci.* 1954, **34,** No. 3, 240-51, bibl. 15, illus. [Bot. and Pl. Path. Div., Canada Dep. Agric., Ottawa]

Field experiments with wheat seed infected with *Helminthosporium sativum*, oat seed infected with *H. avenae* and barley seed infected with *H. sativum* or *H. teres* showed that, in weed-free plots, the percentage of infected kernels in the seed affected germination, but had little or no effect on final grain yields. This effect was due to increased tillering on plots where initial stands were low. Treatment of infected seed had little or no effect on eventual yields. Where weediness was simulated by sowing *Brassica napa*, the compensating effect of tillering on low germination was largely prevented ; under these conditions, seed treatment increased germination and, in many cases grain yields also, particularly where sowing rates were low.—From authors' summary.

459 STRZEMSKA, J. Wyniki badań nad mykorizą u zbóż. [**Investigations on the mycorrhiza of cereal plants.**] *Acta microbiol. Polon.* 1955, **4,** No. 3, 191-204, bibl. 26, illus., English summary p. 203.

The aim of this study was to examine the occurrence and the intensity of the development of mycorrhiza in the roots of cereal plants and its dependence on the age of the plants, and on soil type and pH. Wheat, rye, oats and barley were examined. The endotrophic mycorrhiza was found in roots of all plants examined. It was more often present in roots of barley than in roots of wheat and oats ; the mycorrhiza in rye was somewhat rare. The fungal growth was most pronounced in the roots of wheat, but less abundant in roots of oats and barley. The root infection takes place in spring during the period of sprouting. The infection of young, winter plants during autumn was noted only exceptionally. The intensity of the development of mycorrhiza was correlated with plant age. The fungus enters the roots of oats exclusively through the root-hairs ; in the other plants tested the fungus enters the root-hairs and other epidermal cells. The development of mycorrhiza was observed in the lateral roots of the whole root system. When the symbiotic fungi are absent, the roots of wheat, oats and rye are deformed and the root cells are irregular in shape. This deformation was most pronounced in oats, but less marked in rye and in wheat. In barley no correlation between the infection of the roots and their form was noted. The symbiotic fungi infecting rye and wheat are morphologically almost identical. The fungus entering the roots of barley is very similar. On the other hand, the fungus in oat roots differs greatly from the symbionts of other cereal plants.—From author's summary.

460 RAZUMOV, V. I. and OLEĬNIKOVA, T. V. [**Vernalization of winter cereals at temperatures below zero.**] [Russian] *Fiziol. Rast.* (*Pl. Physiol., USSR*) 1955, **2,** No. 5, 497-504, bibl. 13, illus. [All-Union Inst. Pl. Industr., VASHNIL (Acad. Agric. Sci.), Leningrad]

A knowledge of the conditions under which the vernalization phase is passed in winter cereal crops is essential, mainly because winter resistance of the cereals is closely connected with their stage of vernalization. The authors' study is concerned with two problems : (1) the vernalization of winter cereals under varying temperatures above and below 0°C. ; and (2) the length of time required to complete the vernalization stage as affected by negative temperatures, and the effect of such temperatures, during several years, on characteristics of the vernalization phase. Earlier works have shown that it is possible to vernalize winter cereals by negative temperatures (*Fld Crop Abstr.* 2 : 1300), but the rate and character of vernalization show variations. Experiments made with the rye variety Vjatka are described. They demonstrate that vernalization progresses, and can also be initiated, at −4°C. At −6°C. the process is very slow ; and, while it is practically impossible

to initiate vernalization at this temperature, some acceleration in plant development has been noted. Varieties of wheat and rye grown in eastern continental regions of the USSR are more easily vernalized at negative temperatures than are varieties from the west and north-west areas. Studies made at the Institute of Plant Industry have shown that Vjatka rye from the Kirov Province has a longer vernalization phase than has Žitkinskaja rye from eastern Siberia (Čitinsk Province). The latter is vernalized more readily at —4° than is the former. This is attributed to the fact that, in Čitinsk, the period from the onset of the period with a daily temperature of 10°C. to the time when negative temperatures are attained is 22 days (13 Sept. to 5 Oct.) but is 39 days in Kirov (11 Sept. to 20 Oct.). Thus, with this prolonged autumn period in Kirov, crops are developed with a longer vernalization phase compared with those in Čitinsk, and it is clear that the character of the vernalization phase in winter cereals is conditioned by unfavourable autumns. An account is given of vernalization experiments made with various winter wheats. The data show that vernalization is completed more rapidly when the plants are subjected to negative temperatures from their first growth. This, of course, is rarely the case in nature. It is maintained that in winter cereals the completion of this phase under negative temperatures leads to changes in the character of the phase itself. The facile ability of winter varieties from Eastern USSR to pass through the vernalization phase at negative temperatures is explained by the fact that a significant part of the phase is completed each year under negative temperatures, whereas in western areas there is less total time during which negative temperatures prevail. It is concluded that the completion of the vernalization phase under natural conditions at negative temperatures exercises a formative influence on the character of the phase in crop varieties, this influence depending on the climate of the region in which the crop is grown.—M.H.

461† CLEGG, K. M. **The application of the anthrone reagent to the estimation of starch in cereals.** *J. Sci. Fd Agric.* 1956, **7,** No. 1, 40-4, bibl. 16. [Rowett Res. Inst., Aberdeen, Scotland]

A fuller account is given of the method noted in Abs. 99. Results are given of the starch content of many products, including pure starches, sorghum, oats, wheat, barley, cereal by-products, and grass products.—M.P.

462 WARREN, F. S. and DIMMOCK, F. **A comparison of moisture determination methods for grain corn.** *Canad. J. agric. Sci.* 1954, **34,** No. 5, 435-53, bibl. 2. [Forage Crops Div., Cent. Exp. Fm, Ottawa]

Tests were made of the moisture content of 122 samples of hybrid maize grain with moisture contents ranging from 21·6-44·2%, using the Brown-Duvel oil distillation method, the electrical dielectric tester and the ear-shrinkage methods. The Brown-Duvel method is a standard one in Canada. Based on this, the standard error for the electrical tester was 0·83-2·52 percentage units, and for the ear-shrinkage method, 1·67-3·17 percentage units. About 70% of the electrical-tester results differed less than 1% from those using the Brown-Duvel method and the electrical tester was considered accurate enough for comparing maize yields in general experimental work.—P.J.B.

LEGUMES

SOYABEANS

463† LAUMONT, P. and BLANCHARD, M. Conseils pratiques sur la culture du soja dans la région de Bone. [**Practical advice on growing soyabean in Bona region (Algeria).**] *Publ. Union Agric. Est Algérien* [n.d.] pp. 7.

Advice is given on growing soyabean for seed and for forage.—E.B.O.

464† BLANCHARD, M. L'intérêt du soja en élevage en Algérie. [**The interest in soyabean for live-stock raising in Algeria.**] [n.d.] pp. 6, bibl. 5. [Serv. Exp. Agric., Maison Carrée, Algeria]

Information is given on the use of soyabean for green forage, silage, hay, seed and milk. Soyabean milk is especially important for rearing calves.—E.B.O.

465 WEISS, M. G. and STEVENSON, T. M. **Registration of soybean varieties, 5.** *Agron. J.* 1955, **47,** No. 11, 541-3, bibl. 12. [Fld Crops Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

Varieties described are: Dortchsoy 67, Dorman, Capital, Harosoy and Improved Pelican (Reg. Nos. 14-18, respectively). Dortchsoy originated from a cross between an early-maturing selection from Macoupin and Ogden. It is determinate in growth habit, has pronounced side branching, pods with 2-3 beans, is of medium height and in maturity Group V. It is adapted to the mid-south and to an area slightly south of that covered by S-100. Dortchsoy has a higher seed oil-content and better seed quality than S-100 and has a more dense growth habit. Dorman was selected from a cross Dunfield × Arksoy 2913. It has a determinate growth habit, moderate height, prolific side branching and dense, spreading foliage. It is highly resistant to shattering, is in maturity group V and adapted to the area now covered by S-100. In

co-operative regional tests in 1951-3, mean seed yields of Dortchsoy 67, Dorman and S-100 were 25·9, 24·6 and 24·4 bu. per ac., with mean seed oil-contents of 21·6, 21·7 and 19·9%, respectively. Capital was selected from a cross Strain 171 × AK (Harrow). It is a moderately tall variety, with erect, determinate growth and numerous small side branches. It is in maturity Group 0 and is about 3 days later than Mandarin when grown at Ottawa. It is adapted to central Minnesota and Wisconsin, northern Michigan and south-eastern Ontario. Mean seed yields of Capital and Mandarin during 1946-53 in regional tests were 28·8 and 28 bu. per ac., with oil contents of 20·2 and 19·4%, respectively. Harosoy was selected from a backcross Mandarin × (Mandarin × AK). It has an upright, determinate growth habit, short branches held close to the main stem and is resistant to shattering. Harosoy matures about 3 days earlier than Hawkeye and has better resistance to stem canker. It is in Group II for maturity and is adapted to north-eastern Nebraska and south-eastern S. Dakota, through the north of Iowa, Illinois, Indiana and Ohio, to south-western Ontario. In regional trials in 1951-3, mean seed yields of Harosoy and Hawkeye were 32·5 and 31·6 bu. per ac., and mean seed oil-contents were 20·5 and 20·8%, respectively.—P.J.B.

466 GRAY, S. G. **Experiments with soyabeans in Australia.** *Tech. Pap. 3. Div. Pl. Industr. CSIRO* 1955, pp. 18, bibl. 12.

Over 300 introductions were tested in soyabean trials in several parts of Australia from 1944-51. From the trials at Katherine, N.T., Redlands Bay, Qd, and Redcliffs, Vict., results showed that there was a consistent relationship between relative maturity of varieties and latitude. The most suitable varieties at each locality were those originating from comparable latitudes overseas. Other information obtained from the trials is discussed.—M.P.

467† BONNIER, C. and SIRONVAL, C. **Influence of day-length on nodule formation in *Soja hispida* by a specific *Rhizobium* strain.** *Nature, Lond.* 1956, **177,** No. 4498, 93-4, illus. [Inst. Agron., Gembloux]

Experiments carried out with the Capitole and Kouban 0375 varieties of *S. hispida* [= *Glycine soja*] have shown that the *Rhizobium* strain used was able to colonize the roots of plants in a 16-hour day, but in an 8-hour day colonization was feeble. It is concluded that the functioning of the leaves, as determined by daylength, influences nodule formation and effectiveness by a specific *Rhizobium*.—M.H.

468 SUN, C. N. **Growth and development of primary tissues in aerated and non-aerated roots of soybean.** *Bull. Torrey Bot. Cl.* 1955, **82,** No. 6, 491-502, bibl. 28, illus. [Ohio State Univ., Columbus]

469 HASHIMOTO, T. **Studies on the magnesium nutrition of crops. 4. Relation among magnesium, calcium and potassium in crops.** *J. Sci. Soil, Tokyo* 1955, **26,** No. 4, 139-42, bibl. 18, illus., English summary p. 142. [Hiroshima Agric. Coll., Japan]

The experiments reported were carried out on soyabean plants, grown in nutrient solutions.—P.J.B.

GROUNDNUTS

470 SELLSCHOP, J. **Groundnut production [in South Africa].** *Fmg in S. Afr.* 1955, **30,** No. 354, 387-94, illus.

All aspects of groundnut cultivation are considered, with particular reference to conditions in South Africa. The main production areas are: north-western Orange Free State, western and northern Transvaal, northern Natal and the Vaalhaartz Irrigation Settlement areas. The most extensively grown variety is Natal Common; Virginia Bunch, Egyptian Giant and white-kernelled varieties are also grown.—M.P.

471 BHAVANI SHANKER RAO, M. and SRINIVASALU, N. **Groundnut irrigation experiment.** *Madras agric. J.* 1955, **42,** No. 9, 388-91, bibl. 1. [Agric. Res. Sta., Palur]

Irrigations were given to the TMV 4 strain every (a) 10th, (b) 15th (c) 20th and (d) 25th day. Two tables, one giving yield data and another showing the economics of the treatments, are given. Irrigating every 10th day from the day of first flowering gave the highest yield and net return in the 2 years of the experiment. In the first year, with a better distribution of rainfall, treatment (b) gave a net return little short of that from (a), but, in the second year when the rain fell mainly towards the end of the season, (b) was uneconomic. Treatments (c) and (d) proved low-yielding and uneconomic in both years.—P.M.G.

472 FOWDEN, L. **The deamidase of groundnut plants (*Arachis hypogaea*).** *J. exp. Bot.* 1955, **6,** No. 18, 362-70, bibl. 19, illus. [Bot. Dep. Univ. Coll., Gower St., London, W.C.1.]

The distribution of the deamidase enzyme system within the different organs of the plant has been determined and some of the properties of the enzyme present in leaf extracts are recorded.—From author's summary.

473 GILLIER, P. Fumure de l'arachide au Sénégal. [**Groundnut manuring in Senegal.**] *Oléagineux* 1956, **11,** No. 1, 7-13, bibl. in text.

Recommended doses of fertilizers are given for different regions of Senegal. From results of 4 years' trials, it is concluded that the application of fertilizers to groundnuts is economically advantageous, giving increase in yield of 20-50%.—E.B.O.

474 SOMADE, H. M. B. **Fumigation of agricultural products. 12. Sorption of methyl bromide on groundnuts.** *J. Sci. Fd Agric.* 1955, **6,** No. 12, 799-804, bibl. 16, illus. [Imp. Coll. Fld Sta., Sunninghill, Berks]

Groundnuts, both undecorticated and separated into husk, cotyledon and germ, have been fumigated with methyl bromide. The sorption of the fumigant increases in all cases with the moisture content. Sorption is disproportionately greater as dosage increases, for cotyledons and germ, but not for husk. Field trials in England and in Nigeria have confirmed that under normal conditions groundnuts are unharmed by methyl bromide fumigation. Fungal attack is suppressed and early development mildly stimulated by the treatment. High doses of methyl bromide impair the germination of groundnuts of too high a moisture content.—From author's summary.

475 POPOVA, G. I. [**The utilization of groundnut husks.**] [Russian] *Priroda, Moskva* (*Nature, Moscow*) 1955, **44,** No. 12, 88-9, illus. [Forest/Chem. Lab., Ural Filial Acad. Sci. USSR, Sverdlovsk]

In 1941 the total world area under *Arachis hypogaea* was 7 million ha.; of this, 2·5 million ha. were in India and 1·4 million ha. in China. In the USSR, groundnuts were not sown in pre-Revolution days and in 1930 the area under the crop was insignificant. In 1940, however, the sowings amounted to 22·8 thousand ha. At present the groundnut is cultivated in the Krasnodar Territory, in the Ukraine, and in the Uzbek, Turkmen and Tadžik Republics. Hitherto, only the kernels and haulms have been utilized, the husks (which usually comprise 32% of the total plant weight) being generally burnt. It has been demonstrated in the above Laboratory that the husks are similar to cotton hulls in regard to their content of pentozans and hydrolysing polysaccharides. It is maintained that the plant has value for industries which utilize these substances.—M.H.

PEAS

476 ANDERSSON, Y. and ÅKERBERG, E. Odling och skörd av ärter. [**Growing and harvesting peas.**] *Medd. 256. Jordbrtek. Inst.* 1954, pp. 52, illus.

A review is given of practical techniques for the cultivation of peas for threshing and fodder peas in Sweden and of their mechanised harvesting, threshing and drying. Aspects of cultivation reviewed include: choice of varieties, place in rotation, soil and moisture requirements, liming and manuring, seed inoculation, soil treatments, sowing dates and sowing depth, seed dressing, weeds and weed control, pests and diseases.—P.J.B.

477 BINGEFORS, S. and JÖNSSON, A. Våra nuvarande kok- och foderärt-sorter i belysning av försök utförda i södra och mellersta Sverige. **Our present varieties of cooking- and fodder-peas. Experiences from field trials in southern and middle Sweden.** *Sverig. Utsädesfören. Tidskr.* 1954, **64,** No. 5, 283-308, bibl. 28, illus., English summary pp. 306-8.

The results are given of trials with the yellow culinary pea varieties Torsdags III, Kloster and Stråll and the green culinary variety Concordia. Data are given of the area under culinary peas in different districts of Sweden. The Mälar and Östergötland districts contained 66 and 19%, respectively, of the total area of 11,500 ha. under this crop. There were considerable variations from district to district in the relative yields of the different varieties. In the Skåne and Blekinge districts, Kloster and Stråll outyielded Torsdags III by a considerable margin. In Östergötland, there was little difference between the varieties. Except for the Skaraborg district, where Torsdags III has outyielded Kloster, there were no significant differences between the varieties in west Sweden. In the Mälar and Hjälmar districts, Kloster has outyielded Torsdags III. Kloster and Stråll have averaged 4 days later than Torsdags III in maturity; under relatively adverse growing conditions, Torsdags III has been still earlier than Kloster and Stråll. Concordia has averaged 8 days later than Torsdags III in maturity and has given lower yields. The results are also given of trials with fodder peas.—P.J.B.

478 SKOLKO, A. J. and others. ***Ascochyta* diseases of peas in Canada—with special reference to seed transmission.** *Canad. J. agric. Sci.* 1954, **34,** No. 4, 417-28, bibl. 36. [Bot. and Pl. Path. Div., Canada Dep. Agric., Ottawa]

Data are given of 5-year averages of seed infection in 44 pea varieties inoculated in the field with 10 isolates of *Ascochyta pisi*. The most resistant varieties were Alaska, A-100, Thos. Laxton, Advancer and Super Alaska. The resistance of Thos. Laxton was unexpected, owing to the known susceptibility of this variety and its derivatives in other trials.—P.J.B.

479 REYNOLDS, J. D. **Marsh spot of peas: a review of present knowledge.** *J. Sci. Fd Agric.* 1955, **6,** No. 12, 725-34, bibl. 52, illus.

480† HYDE, T. G. **Nitrogen metabolism in *Pisum sativum*.** *Proc. roy. Soc. Edinb. Sect. B* 1954-5, **65,** No. 3, 299-316, bibl. 33, illus. [Biochem. Dep., Queen's Coll., Dundee]

The nitrogen metabolism of both pods and seeds of *Pisum sativum* has been followed at 16 stages of growth. The distribution of free amino acids and related compounds has been investigated by paper partition chromatography.—Author's summary.

OTHER

481 SIVARAMAKKRISHNAN, V. M. and SARMA, P. S. **The metabolism of glutamic acid in germinating green gram [*Phaseolus radiatus*] seeds.** *Biochem. J.* 1956, **62,** No. 1, 132-5, bibl. 17. [Univ. Biochem. Lab., Madras 25]

482† BARBACKI, S. and others. **The biological and technological properties of early white lupin.** *Bull. Acad. polon. Sci.* 1955, **3,** No. 6, 213-18, bibl. 6, illus.

This paper contains a description of the biological and technological properties of the first variety of white lupin (*Lupinus albus*) produced for agricultural use in Poland. White lupin was scarcely grown at all in Poland previous to World War 2. The only exceptions were populations of bitter varieties, maturing late and sensitive to night-frosts, containing in their seeds about 0·8-3% of alkaloids. White early Przebendowo lupin has been selected from populations of bitter varieties at the Research Station of the Institute of Plant Breeding and Acclimatization, at Przebendowo, near Poznań. From the several thousand biotypes selected, a number of varieties has been grown having different vegetation periods and maturing over a period ranging from the first days of August to mid-October. Forms of different morphological structure and physiological properties, as well as biotypes able to withstand night-frosts of —8°C. have been selected. Among others, a variety of white early Przebendowo lupin has been bred, an account of which is given.—Extracts.

483 WHITESIDE, J. O. **Stem-break of sunn hemp in Southern Rhodesia.** *Rhod. agric. J.* 1955, **52,** No. 5, 417-25, bibl. 2, illus.

An account is given of the behaviour of the causal fungus *Colletotrichum curvatum* and of the factors affecting its epidemiology. Seed treatment with TMTD preparations, using 8 oz. to 200 lb. seed, gave good control of both surface and trash contamination. The alternation of sunnhemp with other green-manure crops in the rotation is recommended. Measures aimed at reducing the severity of the disease include conservation practices, the application of appropriate fertilizers particularly where phosphate is deficient and the avoidance of excessively high sowing rates.—From author's summary.

GENERAL

484† LECHNER, L. Ergebnisse und Schlussfolgerungen aus Importsaatprüfungen zu Futter- und Gründüngungsleguminosen 1953. [**Results and conclusions from 1953 trials with imported seed of fodder plants and of legumes for green manure.**] *Saatgutwirtschaft* 1955, **7,** No. 11, 312-14. [Bayer. Landessaatzuchtanstalt, Weihenstephan/Obb, W. Germany]

This is an incomplete article in which the external characters and the performance of seed of fodder plants and green-manure legumes are tabulated. The characteristics and yields of freshly imported seed from these same sources will be compared from year to year to ascertain if the seed represents a type typical for its region.—D.B.

485† ISHIZAWA, S. and TOYODA, H. **Comparative study on effective and ineffective nodules of leguminous plants.** *Soil Pl. Fd, Japan* 1955, **1,** No. 1, 47-8, bibl. 8. [Soil Microbiol. Lab., Nat. Inst. Agric. Sci., Tokyo]

Observations are made on : the morphology of the nodules formed by effective and ineffective strains of *Rhizobia* on soyabeans, peas, red clover and *Astragalus sinicus* ; the starch content of nodules on pea and *A. sinicus* plants ; the amino-acid content of the nodules produced by effective and ineffective strains of *Rhizobia* on pea and soyabean plants.—P.J.B.

ROOTS

SUGAR-BEET

486 GRIMALDI, A. La valorizzazione della bieticoltura nell'Italia centrale. 1. Ricerche sperimentali eseguite sulla barbabietola nel 1954. 2. Le ricerche sperimentali nella pianura di Cecina. [**The improvement of sugar-beet cultivation in central Italy. 1. Experimental investigations with sugar-beet in 1954. 2. The experimental investigations on the Cecina plain.**] *Industr. saccar. ital.* 1955, **48,** No. 1-2, 1-21. [Ist. Agron., Univ. Perugia]

1. A trial was carried out on the Foligno plain in 1954, a year favourable to sugar-beet cultivation, to compare 10 sugar-beet varieties, including both Italian and foreign types. Sowing took place on 13 March and harvesting on 9 September or 1 October. Results showed that the

average root yields were very high, compared with the yields usually obtained in that region, and that the root yields were higher from the beets lifted on 1 October than from those lifted on 9 September, this increase being more than 5000 kg. per ha. for the varieties Klein polybeta, Mezzano P and Desprez TM. The varieties Klein polybeta, Maribo P and Klein E yielded best with 9110, 9100, and 9000 kg. of sugar per ha. (average of the 2 harvests), respectively. Manurial trials were also carried out. 2. An account is given of varietal, manurial and cultural trials with sugar-beet on the Cecina plain. —E.B.O.

487 THOMPSON, E. G. **Bolting in early sown sugar beet. Comparison of strains, 1955.** *Brit. Sug. Beet Rev.* 1955, **24,** No. 2, 75-6.

The proportion of bolting in March-sown observation plots of sugar-beet in 1955 is discussed. Of the more widely grown varieties, Bush N and Bush E showed the lowest bolting values with 8·1% and 8·4%, respectively, closely followed by Johnson's E and Sharpe's Klein E. Of the strains occasionally grown in Britain, Klein AA resembled the two Bush strains, while the Cambridge Plant Breeding Institute's strain K.N.B. produced the lowest proportion of bolters at every centre.—M.P.

488 DETROUX, L. and WAUTHY, R. Le désherbage sélectif des champs de betterave. [**Selective herbicides in [sugar-] beet fields.**] *Publ. tech. Inst. belge Amélior. Better.* 1955, **23,** No. 2, 135-9. [Sta. Phytopharmacie de l'État, Gembloux (L.D.) and Inst. Better., Tirlemont (R.W.), Belgium]

In post-emergence studies no suitable herbicide was found. In pre-emergence studies three products showed promise : (1) L.T., a mineral oil with a high (80%) content of aromatic hydrocarbons, applied at 200-300 l./ha. ; (2) L.T.5. the same oil enriched with 5% pentachlorophenol, applied at 80-120 l./ha. ; (3) P.C.P. Na, sodium pentachlorophenate, applied at the rate of 10-15 kg. dissolved in 1000 l. water per ha. At 6 weeks after treatment these herbicides had delayed the emergence of weeds by 3 weeks, and halved their density. The herbicides were particularly effective in killing annual weeds. Soil treatment 20 days before sowing was more effective than 10 days before sowing. The first hoeing could be delayed by 3 weeks. These advantages were obtained without reducing the density or vigour of the beet plants. —D.B.

489 SCARAMELLA PETRI, PIERA. Anatomia delle bietole radicose. [**Anatomy of sugar-beets with divided roots.**] *Industr. saccar. ital.* 1955, **48,** No. 7-8, 185-97, bibl. 19, illus. [Ist. Bot. Univ. Bologna, Italy]

Histological investigations were carried out for several years with roots of different sugar-beet varieties from all parts of Italy to study the "divided root" phenomenon. All the roots studied had 2, or more, divisions. Such roots are of low value for sugar production. Results confirmed the traumatic nature of this phenomenon, but a particular susceptibility in some varieties was not excluded. This susceptibility is thought to be related to a low resistance to traumatic factors. Varieties which are resistant to frost, drought and insect attack develop a lower percentage of divided roots than susceptible varieties. Premature flowering is often a consequence of " divided root."—E.B.O.

490 SLADKÝ, Z. Stadijní zralost pupenů sazeček cukrovky ve vztahu k její produktivitě. **The productivity of sugar-beet as influenced by the ripeness of the buds.** *Sborn. čsl. Akad. Zeměd.* (*Ann. Acad. csl. Agric. Ser. Pl. Prod.*) 1955, **28,** No. 9, 707-12, bibl. 5, illus.

When the terminal bud is cut off, the flowering stems of *Beta vulgaris* var. *saccharata* which develop from the upper lateral buds bear a greater number of glomerules with an enhanced germinating capacity compared with untreated control specimens. If the decapitation is deep, sterile vegetative stems grow from the lower buds. It is claimed that this effect is due to the inhibiting influence of the terminal bud.—M.H.

491 ULRICH, A. **Influence of night temperature and nitrogen nutrition on the growth, sucrose accumulation and leaf minerals of sugar beet plants.** *Pl. Physiol.* 1955, **30,** No. 3, 250-7, bibl. 2, illus. [Univ. California, Berkeley, USA]

A low night temperature (10°C. and 4°C.) caused a decrease in the growth of storage roots of sugar-beet and at the same time increased the sucrose content of the roots. These effects took place whether the beets were deficient in, or had an abundant supply of, nitrogen. A nitrogen deficiency, regardless of night temperature, resulted in an increase in storage of sucrose. Ripening or "sugaring up " was therefore induced by changes in the external environment (low night temperatures and nitrogen deficiency) rather than by an internal, self-regulatory mechanism. From the practical standpoint, the observations indicate that every effort should be made to induce a nitrogen deficiency in a field of beets at the end of the season and then to harvest the crop after a period of cool weather. The leaf minerals studied were phosphates and potassium salts in petiole and blade. —D.B.

492† SOMMER, E. Die Untersuchung der elektrischen Leitfähigkeit bei Zuckerrüben und

Zuckerfutterrüben vom Keimlingsstadium an. [**Electrical conductivity in sugar-beet and fodder sugar-beet from the seedling stage onwards.**] *Züchter* 1955, **25,** No. 11/12, 363-4, illus., bibl. 1. [Inst. Pflanzenzüchtung Kleinwanzleben, Dtsch. Akad. Landwirtschaftswissenschaft, Berlin]

Since it is known that sugar-beet and fodder sugar-beet can be distinguished by differences in their electrical conductivity, a study was made to determine at what stage of growth the distinction between the 2 types of beet can be established. Beginning with 19-day-old seedlings, the electrical conductivity and angle of refraction of the plant extract from (a) hypocotyl and rootlets and (b) leaves of the sugar-beet Kleinwanzleben N and the fodder sugar-beet Ovana were determined. Under strictly controlled conditions, a clearly recognized and reproducible difference in electrical conductivity could be observed only after 2 months, and only after 4 months had the difference any practical significance. In both varieties, salt content and electrical conductivity of hypocotyl and rootlets were at first higher than in the leaves, but, while these values remained constant in the leaves, they fell rapidly in the hypocotyl and roots. The difference in refractometer readings of the two varieties was noticeable earlier than the difference in their electrical conductivity. Owing to insufficient material, however, these readings were less exact.—D.B.

493 Piron, F. and Simon, M. La situation actuelle de la mécanisation de la récolte des betteraves en Belgique. [**The present situation as regards mechanization of harvesting [sugar-] beet in Belgium.**] *Publ. tech. Inst. belge Amélior. Better.* 1955, **23,** No. 2, 115-33, illus. [Inst. Betterave, Tirlemont (M.S.) and Dep. Agric. (F.P.), Belgium]

Machinery and techniques suitable for use on small holdings, medium-sized and large-scale farms are discussed and illustrated.—D.B.

FODDER-BEET

494† Opsahl, B. Forsøk med stammer av fôrbeter 1950-1953. **Strain trials with fodder beets 1950-3.** *Forskn. Fors. Landbr.* 1954, **5,** No. 7, 525-45, bibl. 5, English summary pp. 537-9.

A report is given of the results of trials at 7 locations in south and south-west Norway with 30 strains of mangels and fodder-beet. After 3 years' trials, 14 varieties were omitted, owing to their poor yields. Highest mean yields of dry matter in the roots were given by the fodder-beet varieties Gul Daeno XI with 787 kg. per decare (0·1 ha.), Pajbjerg Korsroe XI 773 kg., Daehnfeldt 759 kg., Hvid Øtofte XI 757 kg., Barres Strynø mangel 755 kg., Barres Ferritslev mangel 754 kg. and Weibull's Triumf fodder-beet 752 kg. per decare. Highest dry-matter yields of tops were given by Pajbjerg Rex XI with 271 kg. per decare, followed by Hunsballe XI fodder-beet 263 kg., and Hvid Øtofte XI 257 kg. The best varieties, ranked according to dry-matter yield of roots + 60% of tops, and other economic considerations, were Gul Daeno XI, Pajbjerg Korsroe XI, Hvid Øtofte XI, Weibull's Triumf, Svalöf's Solid fodder-beet and Barres Strynø, in that order. There was a strong positive correlation between yields on the one hand, and heat-sum requirement and growth period on the other. There were differences between varieties in this respect. Varieties with high dry-matter contents appeared to be better able to compete with other varieties where conditions were conducive to high, rather than low, yields. With varieties of intermediate dry-matter content, the results of these trials were similar to those carried out in Denmark. In the case of high dry-matter content varieties, dry-matter yields in Norway were, in most cases, lower than those of varieties with low dry-matter contents ; in Denmark, the reverse is the case. The keeping quality of the varieties did not vary much, though high dry-matter content varieties tended to store best.—P.J.B.

495† Kress, H. Sortenwertlinien und Anbauzonen (VI. Teil : Futter- und Zuckerrübensorten). [**Graphs of varietal characters and cultivation zones. (6. Fodder- and sugar-beet varieties).**] *Dtsch. Landw.* 1955, **6,** No. 8, 379-82, illus. [Forschungsstelle für Agrobiologie und Pflanzenzüchtung, Gülzow-Güstrow, E. Germany]

SWEDES

496† King, K. M. and others. **Co-ordinated experiments on chemical control of root maggots in rutabagas in British Columbia and Washington, 1953.** *J. econ. Ent.* 1955, **48,** No. 4, 470-3, bibl. 2. [Dep. Agric., Ottawa, Canada]

Experiments were carried out under a common plan at Victoria, Courtenay, Agassiz and Kelowna, British Columbia, and Puyallup, Washington, in 1953. The results, which confirmed previous findings, showed that highly effective control of root maggots (mainly *Hylemya brassicae* ; at Courtenay also *H. floralis*) attacking rutabagas [*Brassica napus* var. *napobrassica*] is possible and economical with Heptachlor and Aldrin, under a wide range of conditions. By the band method, 1 lb. of toxicant per 3000 ft. of row was applied as a 2·5% dust raked to a depth of about 1 in. into a

10-inch band, immediately before sowing the seed along the centre of the treated area. By the spray method, 2 applications were made ; each consisting of 0·3 lb. of Heptachlor or 0·5 lb. of Aldrin, in about 40 gal. of water, applied per 3000 ft. of row. The furrow method, in which 2·5% dust was placed in the furrow with the seed, was effective at half the dose used in the band method, but resulted in serious reductions in stand in 2 of the experiments. With rows 3 ft. apart, the above doses equal 5, 3 and 2·5 lb. of toxicant per ac. for Heptachlor, and 5, 5 and 2·5 lb. for Aldrin by the band, spray (total of 2 applications) and furrow methods, respectively. Seed treatment did not show promise.—E.B.O.

POTATOES

497 AZARIAH, M. D. and SAPTHARISHI, K. **Crop rotation studies on potatoes.** *Madras agric. J.* 1955, **42,** No. 9, 377-80, bibl. 4. [Agric. Res. Sta., Nanjanad]

Barley, oats, samai (*Panicum miliare*), korali (*Setaria pallidifusca*), lupins and fallow were included in 17 different rotations. The unit of rotation was a two-year period comprising 4 cropping seasons. Three units, viz., 1942-3, 1944-5, and 1945-6, were statistically examined. Continuous potato cropping gave the maximum total yield, with reduction of yields and increase of pests and diseases after the first year. When lupins were grown as a green manure in the second season every year, the optimum yield of potatoes was maintained in 5 out of the 6 years. Reduced potato yields resulted after cereals, especially oats.—P.M.G.

498 BLAKE, G. R. and others. **Studies on supplemental irrigation of potatoes in New Jersey.** *Amer. Potato J.* 1955, **32,** No. 9, 327-31, bibl. 4. [N.J. Agric. Exp. Sta.]

Plot trials were carried out in 1953 and 1954, both years of severe drought, to study the irrigation of potatoes on Sassafras loam. Each treatment consisted of 1-2 in. of water given at depletion levels of 33, 50 or 67% of the available water in the soil. Treatment was repeated at different intervals according to the amount of rain that fell. Irrigation increased potato yields by 41% in 1953 and 70% in 1954, on an average. Potato yields were equally good when the available soil moisture was depleted by 33-67% before irrigation. It is concluded that the application of 1·5-2 in. of water at 10- to 12-day intervals in rainless periods in midsummer is adequate.—E.B.O.

499 MATTHAEI, G. Beeinflussung des Stärkeertrages der Kartoffel durch pflanzenbauliche Massnahmen. [**The effect of cultural practices on the starch yield of potatoes.**] *Kartoffelbau* 1955, **6,** No. 11, 241-3, illus. [Inst. Pflbau u. PflZücht., Univ. Kiel, W. Germany]

In experiments with the varieties Capella, Ackersegen and Augusta, statistically significant figures were obtained which show that for starch yield : (1) early planting (20 April) was superior to late planting (10 May) ; (2) K applied as K_2SO_4, i.e. without Cl ion, was superior to K as KCl ; (3) spraying to prevent *Phytophthora* infection was superior to no spraying ; (4) of the varieties, Capella gave by far the greatest yield of starch.—D.B.

500 MINISTRY OF AGRICULTURE NORTHERN IRELAND. **Reports from the counties. Potato variety trials.** *Mon. Rep. Minist. Agric. N. Ire.* 1955, **30,** No. 6, 172-4.

The 4 first-early potato varieties on trial gave similar yields but Ulster Prince yielded most as ware size and least as seed potatoes and had a low yield of chats. Of the 2 second-early varieties, Ulster Ensign outyielded Ulster Emblem. Arran Banner continued to be the top yielder of the 5 maincrop varieties, but also had a high proportion of diseased tubers. Ulster Supreme and Stormont Dawn were satisfactory croppers.—M.P.

501 RIEMAN, G. H. and SCHULTZ, J. H. **Red Beauty : a new bright-red medium-maturing variety of potato, resistant to Verticillium wilt.** *Amer. Potato J.* 1955, **32,** No. 9, 346-9, illus. [Wis. Univ., Madison]

502 TIZIO, R. M. and others. Efectos de las temperaturas previas a la plantación sobre la variedad Katahdin en el primer año de cultivo en el país. [**Influence of temperatures before planting on the potato variety Katahdin in its first year of cultivation in Argentina.**] *Rev. Invest. agric., B. Aires* 1955, **9,** No. 2, 143-54, bibl. 9.

Results from a first trial showed that potato tubers which had been kept, in the sprouted condition, at 29·8°C. for 44 days yielded 51% more in weight than tubers which had been kept at 8·6°C. for the same period. The number of tubers produced from the former group was 25% greater than from the latter one. Results from a second trial showed that (a) the yields per plant from tubers which had been kept at 30°C. for 15 or 23 days were similar to that from the control which had been kept at 8·6°C. for 45 days ; (b) the yields from tubers which had been kept at 30°C. for 30, or 37, days were about 25% higher than the yields in (a) ; (c) the yields from tubers kept at 30°C. for 45 days were 73% higher than the yields in (a).—E.B.O.

503 EHRENDORFER, K. Vergleichende Vorkeimversuche mit Licht- u. Dunkelkeimen. [**Comparative trials on chitting [potatoes] in**

darkness and light.] *Bodenkultur* 1955, **8,** No. 2, 168-81, bibl. 20, illus. [Hochsch. Bodenkultur, Wien, Austria]

The result of a 5-year experiment with seed potatoes of several varieties showed that, when allowed to sprout under similar temperatures, sprouting in the dark is a better pretreatment than sprouting in the light. Plants from the former emerged and flowered from 3 to 6 days earlier than from the latter, while yields from light-sprouted tubers were, on an average, 12·2% lower than from dark-sprouted tubers. The lower yield is a consequence of the smaller size of the tubers formed on plants growing from light-sprouted tubers. Before planting, the turgid dark-sprouted tubers should be allowed to wilt slightly by placing them in a ventilated space for 12-24 hr.—D.B.

504 GOERLITZ, H. Über den Einfluss verschiedener Anbaumethoden auf Ertrag und Pflanzgutwert der Kartoffel. [**The influence of different methods of cultivation on the yield and quality of potatoes grown for seed.**] *Züchter* 1955, **25,** No. 11/12, 351-63, bibl. 19, illus. [Inst. Acker- u. Pflbau, Univ. Rostock, E. Germany]

The salient features of the methods developed in (1) the Netherlands, (2) Germany, and (3) Russia for producing a seed-potato crop are outlined. In a 3-year experiment in the coastal area of Mecklenburg, the 3 methods were compared as regards their influence on the growth, yield and subsequent cultivation value of 8 varieties of *Solanum tuberosum* which varied between medium-early and late. Taking a 3-year average, there was no difference between the Dutch and German methods as regards the number of tubers from healthy plants of seed size (over 3·4 cm. diam.). Compared with the German method the Russian one produced only 60% of such tubers. After 3 consecutive years of cultivation by each of these methods, the difference between the 3 methods was obvious in the morphology and physiology of the subsequent crop. Virus infection could not be prevented by any one of these methods, but the degree of attack in susceptible varieties varied. By the Dutch method, the degree of attack was reduced, by the Russian method it increased. This is largely due to the date of planting and hence the stage of development reached at the time of flight of the leaf aphids : Dutch, March/April ; German, mid-May ; Russian, July/August. Yields of the subsequent crop were largely dependent on the degree of virus infection. For multiplication of susceptible varieties, whether early or late, the Dutch method is suitable for Mecklenburg, especially for stock seed and highest quality seed. For healthy seed potatoes of [virus-] resistant varieties the German method, which demands considerably less labour, is adequate. The planting of sprouted potatoes as early in the year as possible is recommended in order that diseased tops may be removed before the summer flight of the leaf aphid. The Russian method is not suitable for seed-potato multiplication in Mecklenburg as the yields are poor and the crop often diseased.—D.B.

505 HYRE, R. A. **Three methods of forecasting late blight of potato and tomato in northeastern United States.** *Amer. Potato J.* 1955, **32,** No. 10, 362-71, bibl. 9. [U.S. Dep. Agric., Newark, Del.]

Two of the methods tested were based on data of relative humidity and temperature and the other one on data of rainfall and temperature. This last method, in which moving graphs were used, was the most successful and appeared to be reliable. —From author's summary.

506 LLAVERÍA B., M. and others. El hielo de la papa en la Sierra y su control. [**Late blight of potatoes in the Sierra of Peru and its control.**] *Inf. 95. Esta. exp. agric. La Molina* 1955, pp. 18, illus., English summary pp. 17-18.

In a field trial carried out to test 4 fungicides for controlling late blight (*Phytophthora infestans*) on potatoes, Copernate 50 (15% metallic copper and 33% DDT), applied as a 20% dust, was best. Three treatments were given at 100, 107 and 130 days from planting. The yield from the plot treated with Copernate 50 was 28,800 kg. of tubers per ha., against 18,400 kg. from the untreated control. [See also *Fld Crop Abstr.* 7 : 544.]—E.B.O.

507 HARTMAN, R. E. **Potato wart [*Synchytrium endobioticum*] eradication program in Pennsylvania.** *Amer. Potato J.* 1955, **32,** No. 9, 317-26, bibl. 5, illus. [Bur. Pl. Industr., Pennsylvania Dep. Agric., Harrisburg]

508 SEGURA B. de, Consuelo. La "costra plateada" de la papa. [**Silver scurf disease of the potato.**] *Inf. 56. Esta. exp. agric. La Molina* 1955, pp. 8, bibl. 5, illus., English summary p. 8.

Silver scurf disease caused by *Spondylocladium atrovirens* was observed on potato tubers in Peru for the first time in 1954. The control measures given (tested in Brazil) are : soaking the infected tubers in a solution of mercury bichloride for 1·5 hr.; practising a crop rotation of at least 3-4 years ; prompt harvesting of the tubers as soon as they mature ; storing them in a ventilated place.—E.B.O.

509 GRAINGER, J. **Climate, host and parasite in crop disease.** *Quart. J. roy. Met. Soc.* 1955, **81,** No. 347, 80-8, bibl. 16, illus. [Dep. Pl.

Path., W. Scot. Agric. Coll., Auchincruive, Ayr]

The effects of climate on both host and parasite have been studied for 2 serious crop diseases of west Scotland. First-early Epicure potatoes make appreciable growth here before the soil temperature rises to 43°F., which is the minimum temperature of activity of the potato-root eelworm, *Heterodera rostochiensis*, and, when the crop is lifted early in June, cysts of the eelworm are white or yellow in colour. Such cysts make little contribution to the permanent soil infestation. Later lifting allows the cysts to become brown and these add considerably to the permanent soil infestation. Loss in yield of the first-early crop is 30-40%, as compared with 80-100% when the same variety is planted later, at the time for a main crop variety. Significant and near-significant correlations show that a low incidence of club-root of swede, caused by *Plasmodiophora brassicae*, is associated with a relatively high soil temperature in July, relatively high amounts of bright sunshine in June, July and September, relatively low rainfall in September and relatively high rainfall in October. The differential effect of soil temperature on host and parasite in the case of potato-root eelworm is a 'disease-escape' mechanism, but the effects of bright sunshine on the amount of club-root disease are considered to be an effect upon disease involving growth of the host.—From author's summary.

510 LINNIK, G. N. [**The causes of degeneration in the potato.**] [Russian] *Bot. Ž., SSSR* (*Bot. J., USSR*) 1955, **40,** No. 4, 528-41, bibl. 22, illus.

This work comprises a review of the literature on the causes of degeneration of the potato, in addition to an account of the author's observations which have led him to conclude that the fundamental cause of the disorder lies within the plant itself. The outer manifestation of degeneration, the author maintains, is a result of the physiological process of ageing in the plant.—M.H.

511 EHRENDORFER, K. Beitrag zur Morphologie und Anatomie der Kartoffelkeime. [**Contribution to the morphology and anatomy of potato sprouts.**] *Bodenkultur* 1954, **8,** No. 1, 20-33, bibl. 19, illus. [Hochsch. Bodenkultur, Wien, Austria] [Received September, 1955]

The tissues of dark-sprouts, light-sprouts, dark-sprouts which have been placed in the light, and light-sprouts which have been placed in the dark are described and illustrated. In dark-sprouts the point of attachment to the tuber has a waisted appearance ; the sprout elongates to a cone shape and the terminal bud is turned back to form a hook, especially when in the soil, and this facilitates movement through the soil. Cells of the epidermis, cortex, and especially the pith are elongated. They are devoid of starch and the subepidermal layer contains anthocyan. Secondary thickening is only slightly developed. Light sprouts are short and ball-like and appear to be ' seated ' on the tuber. The tip is straight. The cells of the internal tissues do not elongate but increase in size radially. There is a relatively massive secondary thickening of the vascular bundle. The distribution of chlorophyll throughout the tissues is similar to that in the tuber ; the subepidermal layer contains anthocyan. Dark-sprouts which have been placed in the light for a spell (say 4 weeks) take over the physiological functions of light-sprouts. The earlier the change of environment the more complete is the transformation. The base, however, long retains the appearance of a dark-sprout. The light-sprout which has been placed in darkness appears like a light-sprout at the base and like a dark-sprout in the middle portion and apex.—D.B.

512 MONTALDI, E. R. and others. Cambios fisiológicos y bioquímicos entre papa importada (no degenerada) y del país (degenerada). [**Physiological and biochemical differences between imported (non-degenerated) potatoes and local (degenerated) potatoes.**] *Rev. Invest. agríc., B. Aires* 1955, **9,** No. 2, 89-95, bibl. 29.

The auxin, respiratory, catalase and peroxidase activities and the ascorbic-acid content were determined in sprouts from non-degenerated potato tubers recently imported from Canada and in sprouts from potato tubers grown for several years in Argentina which had degenerated but showed no visible sign of virus disease. All the potatoes were were of the Katahdin variety. The respiratory and catalase activities were found to be higher in the sprouts from degenerated tubers. The peroxidase and auxin activities were higher in the sprouts from non-degenerated tubers. No differences were found in the ascorbic-acid content of the two groups of tubers.—E.B.O.

513 BROWN, F. A. and others. **Persistent rhythms of 0_2-consumption in potatoes, carrots and the seaweed, *Fucus*.** *Pl. Physiol.* 1955, **30,** No. 3, 280-92, bibl. 24, illus. [North-west. Univ., Evanston, Illinois ; and Marine Biol. Lab., Woods Hole, Mass., USA]

The oxygen consumption of eye-containing portions of the tuber of *Solanum tuberosum*, transverse sections of the root of *Daucus carota* and thallus tips of *Fucus* sp. was measured continuously over a primary lunar cycle (29 days), the materials being placed in automatic continuous-recording respirometers. The mean daily rate of respiration of the potato showed a 15-day cycle with maxima near the times of full moon and new moon. The

carrot exhibited a minimum about the time of full moon and maxima at about the third quarter and new moon. *Fucus* displayed cyclic variations in rate of respiration with maxima at 6- to 7-day intervals. The average daily pattern for the 29-day period for the potato was found to show a maximum at 4-5 a.m. and lesser maxima at 10 a.m., 3 p.m. and 10 p.m.; highest rates were observed in the morning hours and the rate gradually decreased through the day to the lowest ones in the evening. The average daily pattern for the 29-day period for the carrot was found to show a conspicuous maximum at 4-5 a.m. and a minimum just after noon. An analysis of the data, performed in such a manner as to determine the character of any existing persistent primary lunar cycle of 0_2-consumption, revealed that all three plants possessed such cycles, and the cycles were similar in form and phase relationships. All showed a primary minimum 2-3hr. before lunar zenith, and a lesser minimum 1-3 hr. before lunar nadir. A significant correlation was found between the hourly rates of respiration and the concurrent rate of change in barometric pressure for all three plants. The rate of 0_2-consumption of the potato was decreased about 10% for each 0·01 in. Hg/hr. rise in barometric pressure, and increased by about the same amount for each 0·01 in. Hg/hr. fall. The respiration of the carrot was decreased by both rises and falls in barometric pressure, decreasing about 7-8% for each 0·01 in. Hg/hr. rise and by about 3% for each 0·01 in. Hg/hr. fall. The relationships between the daily and lunar rhythms of respiration and barometric pressure are discussed. The paper ends with discussions of the relationships between the daily and lunar rhythms of respiration and barometric pressure, the nature of the external factors, the possibility of an endogenous rhythm in plants and its functional significance.—D.B.

514 JASCHIK, S. and LINDNER, K. Adatok a különböző talajokon termelt étkezési burgonyák tápanyag összetételéhez. **Composition of nutrients in potatoes grown on different soils.** *Növénytermelés* 1955, **4,** No. 3, 213-18, bibl. 7, illus., English summary p. 218.

Seven different kinds of potatoes grown in 1954 (a) on sandy, and (b) on loam, soil in Kisvárda, (c) on moorland in Keszthely, and (d) on moorland in Nagyecsed have been studied particularly with regard to their contents of crude and pure protein, as well as vitamin C. Potatoes cultivated on moorland are bigger and their crude- and pure-protein content is higher than that of potatoes grown on sandy or loam soil, but when cooked they are inferior in taste and flavour. Owing to their considerable protein content they may be useful as forage. Potatoes grown in the four different types of soil are nearly the same as regards their ascorbicacid content. Those from the moorland in Keszthely contain somewhat more vitamin C, but storage for two or three weeks suffices to reduce the level to that characteristic of the others.—From authors' summary.

515 NISSEN, M. **The weight of potatoes in water.** *Amer. Potato J.* 1955, **32,** No. 9, 332-9, bibl. 7. [Agric. Exp. Sta., Tylstrup, Denmark]

[See *Fld Crop Abstr.* 7 : 1282.]

516 KUMAR, K. and MAHAPATRA, L. **Effect of fertilizer application on the solanin content and the yield of potato tubers.** *Sci. and Cult.* 1955, **20,** No. 12, 604-5, bibl. 3. [Coll. Agric., Hindu Univ. Banaras]

N at the rate of 90 lb. per acre as ammonium sulphate, was applied in the field and in pot trials. In 21 further sets of pot trials, the fertilizing solutions used were Hougland and Snyder's and the modified potato solution of Hougland. The culture solutions resulted in a greater accumulation of solanin in tubers than did ammonium sulphate, but the toxic level was not reached, and the yield of tubers per plant was greater than with the use of ammonium sulphate.—G.M.R.

517 SMITH, W. L. and SMART, Helen F. **Relation of soft rot development to protective barriers in Irish potato slices.** *Phytopathology* 1955, **45,** No. 12, 649-54, bibl. 16. [Pl. Industr. Sta., U.S. Dep. Agric., Beltsville, Maryland]

A customary procedure in the USA is to place potato tubers in a temperature of about 40°F. immediately after harvest, in the belief that such temperatures will protect the tubers from decay developing at bruised, skinned, or cut areas. In the studies reported, tubers of 6 varieties were held at 40°F. after harvest. At 3 equal intervals over a 7-month period after harvest, the tubers were washed, dried and cut into slices 10 mm. thick, and then placed in moist chambers at 40°, 50°, 60°, 70°and 80°F. Tuber slices were removed after 1, 2, 3 or 4 days' treatment and then either sectioned, or inoculated with *Erwinia atroseptica*. After 1 day's temperature treatment, suberin and periderm formation was slight and resistance to *E. atroseptica* low. After 4 days' treatment, suberin and periderm formation and resistance to *E. atroseptica* increased. Irish Cobbler formed periderm more rapidly than the other 5 varieties, while Sebago, Teton and Mohawk formed periderm slowly. All varieties formed suberin and periderm most rapidly at 70 or 80°F. and subsequent susceptibility to invasion by *E. atroseptica* was lowest. Tuber slices held at 40°F. formed only slight suberin and periderm barriers after 4 days.

Suberin formation was evident after 1 day at all temperatures, except 40°F. Periderm layers were not visible until after the second day, and then only at temperatures of 70° or 80°F. Correlation coefficients showed that 85% of the variation in resistance to invasion by *E. atroseptica* under the different treatments was associated with variations in periderm and suberin formation, and that 69% of the variation was concomitant between suberin and periderm formation. From these results, it was apparent that an effective protective barrier would form on cut tuber surfaces within 4 days at temperatures as low as 50°F. ; thus, holding tubers after harvest for about 4 days at 55°-60°F. before storage, appeared to be desirable.—P.J.B.

518 HEINZE, P. H. and others. **Further tests with 3-chloro-isopropyl-N-phenyl carbamate as a sprout inhibitor for potato tubers.** *Amer. Potato J.* 1955, **32,** No. 10, 357-61, bibl. 2. [Pl. Industr. Sta., Beltsville, Md]

3-chloro-isopropyl-N-phenyl carbamate (3-Cl-IPC) was effective as a sprout inhibitor on potato tubers stored at 45°, 55° or 65°F. but not on those stored at 80°F. immediately after treatment. At storage temperatures of 45° or 55°F. the lots treated with 3-Cl-IPC developed slightly less decay than the untreated samples, but at 65°F. the treated samples showed slightly more decay, on average. A 0·5% suspension of 3-Cl-IPC was as effective as a 1% suspension for controlling sprouting at a storage temperature of 55°F.—From authors' discussion and summary.

519 KOERNER, A. C. Kartoffelscheunen in Ziegelbauweise. [**Brickbuilt potato barns.**] *Kartoffelbau* 1955, **6,** No. 12, 260-1, illus.

The construction, insulation and cost of these barns are discussed.—D.B.

520† HACKE, Fr. and SCHARDEY, H. D. Haltbarmachung von Kartoffeln zu Futterzwecken. [**Conserving potatoes for fodder.**] *Kartoffelbau* 1955, **6,** No. 11, 244-5, illus.

In conserving potatoes for pig fodder, the objects are to decompose the starch to make it digestible and to prepare a product which will keep well. Potato flakes and compressed potato meal meet these two requirements. The interaction of the factors involved in the making of compressed potato meal has been studied, the factors being: type of machine for disintegrating the potatoes (cutter or grater), moisture content of potatoes after dehydration and the temperature of the drier. Trials with pigs have shown that the most digestible compressed meal is produced when the potatoes are divided up by the cutter, dehydrated to a moisture content of 58% and heated in the drier at 800°C. The processing problems have been solved but the product is expensive and can be made to pay only by using the dehydrater continuously. The preparation of compressed potato meal fits in with other farm drying processes and with the making of fruit juices because much of the equipment can be used for both processes.—D.B.

521 LUTZ, J. M. and others. **Efficiency of various methods of washing Red River Valley potatoes.** *Amer. Potato J.* 1955, **32,** No. 9, 340-5, bibl. 2, illus.

SWEET-POTATOES

522 SINGH, M. P. and GHOSH, A. N. **Sweet potatoes with better appeal.** *Indian Fmg* 1955, **5,** No. 8, 23, illus. [Agric. Res. Inst., Sabour, Bihar]

Ranger and B5941, of American origin, yielded considerably more, tasted sweeter, and realised better market prices, than the local Indian varieties, when tested at substations throughout Bihar.—P.M.G.

523 WOLCOTT, G. N. and PÉREZ, M. **Control of the sweet-potato weevil in Puerto Rico.** *J. econ. Ent.* 1955, **48,** No. 4, 486-7, bibl. 3. [Agric. Exp. Sta., Puerto Rico Univ., Rio Piedras]

Trials to study the chemical control of the sweet-potato weevil (*Cylas formicarius elegantulus*) on sweet-potatoes were carried out with the variety UPR 3 which is very susceptible to weevil attack. In one of the experimental plots, the soil was sprayed with 23% Aldrin at the rate of 3 lb. per ac. and planted with tops which had been submerged in a solution of 23% Aldrin in 50 gal. of water. The plants were then sprayed four times with 25% emulsifiable Aldrin. This plot produced tubers which were 98% free from weevils, the yield being 11,210 kg. per ac.—E.B.O.

YAMS

524 MATUDA, E. Las dioscoreas del Estado de México. [***Dioscorea* species in Mexico State.**] *Publ. Dir. Agric. Ganad., Mexico* 1955, pp. 61, bibl. 19, illus.

A key is given for the identification of the 27 species of *Dioscorea* present in Mexico State. A botanical description, synonyms and the distribution in Mexico are given for each of these species.—E.B.O.

OTHER

525 MANTARI C., C. El mejoramiento del cultivo de las ocas (*Oxalis tuberosa* Mol.). [**Improvement of the cultivation of *Oxalis tuberosa*.**] *Inform. 47. Div. exp. agric. Div. Agric. Peru* 1955, pp. 16, bibl. 6, illus.

Oxalis tuberosa, a native plant of the Andes, is an important food crop in nearly all the mountain regions of Peru, where it is grown for its tubers at altitudes of 3000-4000 m.a.s.l. Information is given on *O. tuberosa*, including its botanical characteristics, its cultivation in the Titicaca Basin and the nutritive value of its tubers. These have a high content of calcium, phosphorus and iron. The cultivation of *O. tuberosa* is relatively easy. In the native cultivations in the Titicaca Basin, *O. tuberosa* is planted in September, after potatoes, using a mixture of unimproved varieties, and no manure is given. Harvesting takes place in April-May. The tubers are consumed fresh or dehydrated. It is thought that the yields of this crop, which are at present 4000-5000 kg. of tubers per ha., could be raised to over 20,000 kg. by suitable cultural methods. An account is given of varietal and cultural trials carried out for several years. The variety Ckeni yielded best in 1953-4 with 27,030 kg. of tubers per ha. It is intended to multiply the varieties Ckeni, Amajaya and Ruqui o Lluchu-oca in the next season with the object of supplying them to the native farmers.—E.B.O.

526† GOFFART, H. Zum Anbau von Topinambur auf nematodenverseuchtem Boden. [**The cultivation of Jerusalem artichoke on nematode-infested soils.**] *Kartoffelbau* 1955, **6,** No. 12, 262, bibl. 5, illus. [Inst. Hackfruchtbau, Biol. Bundesanst., Münster/Westf. W. Germany]

Since *Helianthus tuberosus* (from tubers remaining in the ground after harvesting the crop) can be kept under control by subsequent cropping with legumes or summer cereals, the question of the cultivation of *H. tuberosus* in soils infested with nematodes which attack potatoes has received attention. The artichokes are used for pig fodder, for human consumption as a substitute for potatoes, and for industrial purposes. The artichoke develops well on nematode-infested soils, and, as with other nematode-neutral plants, its cultivation results in a 45% fall in the nematode population. For destroying young shoots which persist in the next course of the rotation, the herbicide Tributon, based on the esters of 2,4-D and 2,4,5-T, applied in a 65% solution at the rate of 1000 l./ha. was effective in 3 days. It is essential that this treatment should be carried out not later than the beginning of June, before the tubers become longer and the roots stronger.—D.B.

FIBRE CROPS

COTTON

527 NIGERIA TRADE JOURNAL. **Nigerian cotton.** *Niger. Tr. J.* 1955, **3,** No. 4, 157-61, illus.

The present position of cotton cultivation in Northern Nigeria is summarized. Yields on the whole are low ; on Government farms they are of the order of 400-600 lb. seed-cotton per ac., but on native farms the average is considerably lower. In 1953-4 the cotton crop was almost entirely of the strain Samaru 26C. A new re-selection from this strain, Samaru 26 J, is expected to be grown commercially in 1958-9 if it continues to fulfil its present promise.—M.P.

528 BULLETIN D'INFORMATION DE L'INÉAC. Écartements et dates de semis préconisés pour la culture cotonnière en zone Nord. [**Spacings and sowing dates recommended for cotton in the north of the Belgian Congo.**] *Bull. Inform. INÉAC* 1955, **4,** No. 5, 353-5. [Sta. Rech. Agron., Bambesa, Belgian Congo]

Results from trials indicated that in poor savannah soils the optimum spacings for cotton were between 60 × 20 cm. (83,000 plants per ha.) and 80 × 30 cm. (41,600 plants per ha.), and in forest soils between 80 × 30 cm. and 100 × 30 cm. (33,300 plants per ha.). The spacings recommended for native cultivations are 60 × 25 cm. (66,400 plants per ha.) in savannah soils and 80 × 30 cm. in forest soils. The recommended sowing dates vary from 1-15 June to 15-31 July, according to regions.—E.B.O.

529 RAMACHANDRAN, C. K. and SETHURAMAN, V. **Time of planting trials on cotton at the Agricultural Research Station, Palur.** *Indian Cott. Gr. Rev.* 1955, **9,** No. 2, 51-6, bibl. 3. [Madras Agric. Dep.]

Trials of sowing cotton on different dates at the Agricultural Research Station, Palur, during the crop years 1948-52 showed differences in yield which were significant for all varieties tested. The early-sown crops always gave the highest yield of seed cotton per acre. As sowing dates were advanced there was a reduction in yield and a corresponding increase in the percentage of contabescent anthers. All the strains tested showed contabescence of anthers to about the same extent. Other defective characters such as mote content, ill-filled hollow seeds and discoloured embryos were more pronounced in the late-sown crops but not statistically significant. November-sown plots consistently recorded the poorest yield.—G.M.R.

530 QURESHI, M. R. H. and HAFUZULLAH HUSANI, S. **The correlation of the rainfall**

conditions with the yields of rabi cotton at Raichur [Hyderabad State]. *Indian Cott. Gr. Rev.* 1955, **9,** No. 3, 112-19, bibl. 9.

Rainfall data during 5 growth phases and the yields of cotton for 16 years were examined statistically. It was concluded that (a) pre-sowing rainfall did not influence yield, except in so far as it determined sowing date, (b) light or moderate showers helped, and heavy showers hindered, germination, (c) abundant rainfall from germination to first flowering was essential, provided that it was well distributed, (d) rain during the 4 weeks after first flowering caused buds and young bolls to fall, (e) rainfall during the maturity phase increased the yield if rainfall was scanty at other phases ; otherwise it spoiled the quality and colour of the lint and encouraged bollworm attack.—P.M.G.

531 NEGI, L. S. and SINGH, K. **Effect of different rotations on yield of cotton.** *Indian Cott. Gr. Rev.* 1955, **9,** No. 1, 24-6. [Dep. Agric. Punjab]

Results based on one year's data indicate that, among crops used to precede cotton, guara [*Cyamopsis psoraloides*] had the most beneficial effect on the cotton crop.—G.M.R.

532 BEDERKER, V. K. **Improvement of Hyderabad Gaorani cotton.** *Indian Cott. Gr. Rev.* 1955, **9,** No. 1, 1-23, bibl. 4, illus. [Cott. Res. Botanist, Nanded]

The Gaorani Cotton Improvement Scheme was initiated in 1929 in order to maintain the quality and reputation of the valuable indigenous cotton variety, Hyderabad Gaorani, which had been steadily deteriorating owing to the influx of short-staple coarse varieties from neighbouring States. The Hyderabad Government notified the Gaorani tract as a " Protected Area", and, together with this exclusion of poor varieties, research was begun which continued until March, 1949, when the Scheme terminated. A report is given of the work done during this period. It included the breeding of several new strains superior to the original in various respects, and the conducting of cultural, manurial and crop rotation experiments. The further improvement of Gaorani cotton has now been taken over by the Hyderabad Government.—G.M.R.

533 MIŠUSTIN, E. N. and NAUMOVA, A. N. [**The excretion of toxic substances from lucerne and their influence on the cotton crop and microflora of the soil.**] [Russian] *Izv. Akad. Nauk, SSSR (Bull. Acad. Sci., USSR)* 1955, No. 6, 3-9, bibl. 11. [Inst. Microbiol., Acad. Sci., USSR]

It has frequently been observed in areas where a crop of lucerne is maintained for 3 or 4 years that yields of the following cotton crop are seriously lowered. Experiments carried out in the Ždanov Province, Azerbaïdžan SSR, have shown that during the vegetative period lucerne roots excrete saponin into the soil. When lucerne is grown for a prolonged period (more than 3 years) in the same field, the quantity of saponin in the soil is sufficient to menace the cotton crop ; grain crops appear to be less sensitive in this respect. In culture tests it has been demonstrated that the percentage germination in cotton is 92, 64, 32 and 0 when the culture solution contains, respectively, 0·002, 0·06, 0·2 and 1·66 mg./ml. saponin from lucerne roots. Observations carried out during 1950-3 on field rotations have revealed that a pure lucerne break of 3 or 4 years in the rotation lowers the microflora content in the soil. Culture tests designed to study the effect of saponin on soil microflora show that certain species, e.g. *Fusarium* sp., are less sensitive to saponin in the culture medium than are others, e.g. *Trichoderma* sp. and *Bacterium malvacearum*, both of which are suppressed by it. The author concludes that in a lucerne/cotton system it is advisable to grow lucerne for 2 or 3 years only in one rotation.—M.H.

534 CHRISTIDIS, B. G. **Regional variety tests with cotton. Results in 1954.** [Greek] *Sci. Bull. 3. Cott. Res. Inst., Sindos* 1955, pp. 60, English summary pp. 59-60.

The results are given of regional varietal trials in 1954 in Greece. Three varieties tested were American, namely Acala 4-42, Delfos 9169 and Coker 100 W. The remainder were strains produced by selection or crossing from local or foreign varieties at the Hellenic Cotton Institute. Conditions in 1954 were initially poor, but excellent later on in the season, thus favouring late varieties. Coker 100 W was the most profitable variety in these tests. Delfos 9169 was the latest of all Upland varieties tested and was consistently inferior to Coker 100 W in profitability, but superior to Acala 4-42. The widely grown variety 2G, a selection from local stocks, did relatively poorly. A number of E strains produced by crossing local and introduced varieties were superior to 2G and some equalled Coker 100 W in profitability.—From author's summary.

535 GUTKNECHT, J. and ROUX, J. B. Sélection et comportement de variétés de coton au Tchad. [**Selection and behaviour of cotton varieties in Chad.**] *Cot. et Fibr. trop.* 1955, **10,** No. 1, 1-25, bibl. 5. [Inst. Rech. Cot. Text. Exot.]

The cotton variety Allen replaced Triumph in the whole cotton area of Chad in 1944-5. The production of seed-cotton from this area was 57,000 metric tons in 1953-4. Allen is perfectly adapted to Chad, in particular to its dry, hot season. Because of its long vegetative period, almost all the bolls of Allen

are able to mature. In the climate of Bebedjia, in particular, an abundant production of late flowers is considered essential for high yields. Allen is resistant to bacteriose (*Bacterium malvacearum*), but is susceptible to jassid attack. Its ginning return is low, being 28-29%. The varieties 42-5 and 44-10, selected from N'Kourala, are multiplied on native farms. These varieties yield more, are more resistant to jassids, and have a better fibre quality, than Allen. Samaru-26-C will be introduced in North Ubangi for replacing Triumph and 42-5. The varieties A-49-T and A-50-T, selected from Allen Zaria, are an improvement over Allen. These varieties are under multiplication. A-49-T will replace Allen in Mayo-Kebbi and A-50-T will be introduced one year later. Allen-150 and 58-151, also selected from Allen Zaria, are promising.—E.B.O.

536 PATEL, C. T. and PATEL, G. B. **Long-staple Indo-American cotton type 170.** *Farmer, Bombay* 1955, **6,** No. 6, 27-32, bibl. 3, illus. [Agric. Res. Sta., Surat]

The variety I-A 170, bred at Surat from hybrids of Asiatic and American cottons, is described.—G.M.R.

537 PLANES, G. S. Plagas del algodonero. La desinsectación con bromuro de metilo. [**Control of cotton pests with methyl bromide.**] *Agricultura, Madr.* 1955, **24,** No. 278, 320-3, illus.

Information is given on trials carried out in Spain in which the larvae of *Pectinophora gossypiella* were successfully controlled in cotton seed by fumigating with methyl bromide for a few hours.—E.B.O.

538 WILLE, J. E. and others. Los insectos e insecticidas en la campaña algodonera 1954-55. [**Insects and insecticides in the cotton year 1954-5.**] *Inf. 97. Esta. exp. agric. La Molina* 1955, pp. 20, illus., English summary p. 20.

In the Costa Central, Peru, the metallic insecticides gave complete control of the pests in many areas making it unnecessary to use the new organic insecticides, which are harmful to the biological equilibrium of cotton fields. Among the recommendations for 1955-6 is the sowing of a row of maize in every 7-15 rows of cotton early in the season, a measure which encourages the multiplication of predators of *Heliothis virescens*. The organic insecticides should be used only late in the season when other control measures have proved inadequate.—E.B.O.

539 CALCAGNOLO, G. and SAUER, H. F. G. Efeito de modernos acaricidas no combate ao ácaro do algodoeiro (*Eotetranychus telarius* (L). [**Effect of modern acaricides for controlling the spider mite on cotton.**] *Biológico, S. Paulo* 1955, **21,** No. 9, 153-65, bibl. 6.

Results from a field trial indicated that Systox was more effective than other acaricides tested for controlling the spider mite on cotton, but a reservation is made regarding its use because of its residual toxicity. The following preparations gave good control: Aramite at 0·15% applied at the rate of 1200 g. of active principle per "alqueire" [1 alqueire = 24,200 sq. m.], Sulfenona 0·70% at the rate of 5600 g. of active principle, and Ovotran 0·60% at the rate of 4800 g. of active principle per alqueire.—E.B.O.

540 LAGIÈRE, R. Dommages causés par la foudre dans les plantations de cotonniers. [**Lightning injury to cotton plantations.**] *Cot. et Fibr. trop.* 1955, **10,** No. 1, 54-60, bibl. 5, illus. [Inst. Rech. Cot. Text. Exot.]

In 14 cotton fields of the Ubangi-Shari, circular areas, of 5-25 m. diam., were noted in which the cotton plants were withering or were dead. After having excluded the possibility that this injury was caused by disease, it was concluded that it was caused by lightning.—E.B.O.

541 BOULANGER, J. and GUTKNECHT, J. Influences variétales et climatiques sur le rythme de floraison du cotonnier (*G. hirsutum*). [**Varietal and climatic influences on the rhythm of flowering in cotton (*Gossypium hirsutum.*)**] *Cot. et Fibr. trop.* 1955, **10,** No. 1, 26-34, bibl. 3. [Inst. Rech. Cot. Text. Exot.]

Two investigations to study the rhythm of flowering in cotton were carried out simultaneously at Bambari, Ubangi, and Tikem, Chad, with the varieties Ston O/4, Banda II and A-49-T. Results indicated that the varietal influence was negligible, but that climate influenced the rhythm of flowering. This was accelerated by a hot, dry climate.—E.B.O.

542 KULKARNI, Y. S. and NARKHEDE, A. D. **Virnar cotton responds well to irrigation and manures.** *Farmer, Bombay* 1955, **6,** No. 6, 47-9, bibl. 2.

Experiments showed that in West Khandesh cotton yields can be increased by: pre-monsoon sowing, giving one irrigation in the first week of June; giving an extra application of 100 lb. ammonium sulphate per acre; and giving one irrigation whenever there is a break in the monsoon during the growth of the crop.—G.M.R.

543 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations, season 1954-55. Aden Protectorate.** London, 1955, pp. 8.

INVESTIGATIONS REPORTED :

1. Cotton varietal trials, p. 4. BAR XL-1 gave the highest seed-cotton and lint yields, but a lower ginning outturn than AB-3, which was the highest in this respect and the second in yield of seed-cotton and lint.

2. Cotton pests, p. 5. Sudan bollworm (*Diparopsis perditor*) pupates in the soil and is best controlled by rotation, deep ploughing or flooding.

3. Cotton diseases, p. 5. Wilt (*Rhizoctonia* sp.) is caused by soil-inhabiting fungi and is very prevalent where rotation or fallow is not practised.—P.M.G.

544 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations, season 1954-55. Sudan.** London, 1955, pp. 26, bibl. 2.

INVESTIGATIONS REPORTED :

1. Variety testing at the Gezira station, pp. 4-12. BLR 14/25 was equal to Domains Sakel in yield of seed-cotton and slightly superior to it by Shirley Institute spinning-test standards. BAR XL-1 was reported equal in quality to X1730A. Random crossings were made within the strain BAR 7/8·2 *hirsutum*; the crossed seed outyielded the natural by 11%, due apparently to an increased number of bolls per plant.

2. Variety testing, Kordojani, Nuba Mts., p. 21. BAR 7/8·2 was superior to BAR 7/8·1 in lint yield at all but one site.

3. Seed treatment, p. 25. Response to Perecot treatment [unreplicated] appeared to be directly related to the period under crop. On new land Perecot gave no response, but under 3 years' continuous cotton, an estimated increase in yield of 15% was obtained.—P.M.G.

545 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations, season 1954-55. Cotton Research Station, Namulonge, Uganda.** London, 1955, pp. 41, bibl. 15.

INVESTIGATIONS REPORTED :

Time of sowing and spacing. By A. N. Prentice, pp. 9-11. Yields of cotton sown on (a) 18 June, (b) 9 July, (c) 30 July and (d) 20 August were compared. Taking the yield of (a) as 100%, delay in sowing reduced yields to: (b) 79%, (c) 54%, and (d) 33%. With moderately close 3 ft. × 1 ft. spacing, the earliest sowing resulted in 27% of the total flowers being recovered as bolls, while with the latest sowing recovery was below 10%. In a spacing trial, there were no significant differences between 7·5-, 10-, 15- and 30-thousand plants per acre. The two wider spacings yielded less when sowing was delayed and were ready for picking a week or two later than the closer spaced crop sown at the same time.

Flat v. tie-ridged cultivation. By A. N. Prentice, p. 12. Cotton sown on the ridge yielded 16% less than cotton grown on the flat. The slower germination on the ridge may have been the factor responsible in the unusually dry season.—P.M.G.

546 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations, season 1954-55. Nyasaland.** London, 1955, pp. 10.

INVESTIGATIONS REPORTED :

Cotton variety trials, pp. 3-6. Albar 51-639 gave the highest yield at Chitala and Makanga ; it also did well at Ngabu. The ginning outturn of varieties at Makanga (Lower River) was, on an average, 4% lower than that of the same varieties at Chitala, due possibly to some factor such as fibre density per unit area of seed surface.

New selections are based on a minimum ginning outturn of 32·5% under Lower River conditions and a minimum halo length of 27 mm., pp. 6-7. —P.M.G.

547 INDIAN CENTRAL COTTON COMMITTEE. **Thirty-third Annual Report.** 1954, 30-63, illus., col. map in pocket showing distribution of improved varieties of cotton.

INVESTIGATIONS REPORTED :

1. Trace element studies at the Institute of Plant Industry, Indore, pp. 33-4, showed that while the application to the soil of fairly large doses of Cr, Mn, Zn, Cu and B produced small increases in yield, small doses were ineffective. The residual effect of applying any one of these elements lasted for two seasons.

2. In pot and field trials at Indore, p. 34, the application of chemical hormones produced marked effects on the morphological characters of the cotton plant ; some produced an increase of dry matter per plant, mainly in the fruiting parts, and consequently of yield. Carbohydrate formation appeared to be greater in the sprayed than in the control plants. The most economical preparation was α-naphthalene acetic acid.

3. Time of sowing, p. 34. At Dharwar, Bombay State, early sowing gave a 15% increase in yield over the normal time of sowing the variety Jayadhar, and late sowing produced an 8% decrease. A higher response to manuring with ammonium sulphate when combined with early sowing was observed. At Gadag, Bombay, sowing only 2 weeks later than the first possible date reduced the yield by 25%.

4. Preceding legume. China mung [*Phaseolus radiatus*] was found to be the only legume which matured sufficiently early for the variety Laxmi to be sown by mid-September.

5. Intercropping of cotton with groundnut, tur [*Cajanus indicus*], mung [*Ph. radiatus*] and maize, p. 39. The most remunerative practice was

growing 2 rows of cotton alternating with 10 rows of groundnuts.
6. Pre-monsoon and monsoon sowing of cotton. There were no significant differences in yield.
7. In a cultural trial, p. 39, interculture with hand weeding followed by daura or ridger, or both, resulted in significantly higher yields than those obtained without these measures.
8. Seed rates and spacing trial with desi cotton, p. 39. There was no significant variation in the yield obtained from seed rates of 10, 20, and 30 lb. per acre. The usual 14 in. spacing between rows increased yield significantly over 21 in. and 28 in. spacings. There was no interaction between the different seed rates and spacings.
9. Varietal trials in the different Indian States are reported on pp. 41-63.—G.M.R.

548 SAHASRABUDHE, V. B. **Block efficiency and number of replications for progeny row trials of cotton.** *Indian Cott. Gr. Rev.* 1955, **9,** No. 3, 106-11, bibl. 3. [Inst. Pl. Industr., Indore]

FLAX

549 LARSEN, A. and BAGGE, H. Forsøg med sorter af spindhør. [**Trials with fibre flax varieties.**] *Beretn. 479. Stat. Forsøgsvirk. PlKult.* [Contained in] *Tidsskr. Planteavl* 1954, **57,** No. 3, 458-97, English summary pp. 495-6.
A report is given of the results of trials in Denmark with 41 varieties of fibre flax during 1933-52. In 21 trials during 1933-9, Liral Sussex gave the highest long-fibre yields, followed by Stormont Cirrus with 6% lower yields and Stormont Gossamer with 9% lower yields. In trials during 1939-48 (34 trials) Liral Sussex again gave the highest long-fibre yields, followed by Priekulu Linija 665, with 4% lower yields, and Stormont Gossamer with 11% lower yields. In trials during 1949-52, Hareskovgaard 75 and Percello gave 5 and 1% higher long-fibre yields, respectively, than Liral Sussex. Cascade in 10 trials in 1950-52 and Øtofte L. 356 in 8 trials during 1951-2 gave 3 and 7% higher long-fibre yields, respectively, than Liral Sussex. Trials with Stormont Cirrus and Stormont Gossamer showed that their long-fibre yields declined progressively, the longer they were grown for seed in given localities in Denmark. This appeared to be due to infection of the seed by *Polyspora lini* and could be prevented by seed treatment. The effect of seed treatment on the fibre yields of Stormont Cirrus was particularly marked.—P.J.B.

550 PLAUT, M. and MARANI, A. **Experiments with fibre flax varieties.** *Ktavim* 1955, **4,** No. 3, 43-8, bibl. 6. [Agric. Res. Sta., Rehovot, Israel]
Experiments were made to evaluate a number of *Linum* sp. varieties introduced from various countries in 1949-52. The data show that medium-early and medium-maturing varieties are most suitable for the country, and that the following merit further tests : Concurrent, Hollandia, Rembrandt, Wiera, Solido, Noblesse, Fivel, Liral-Crown, Liral-Prince and Liral-Monarch.—M.H.

551 MARGHERITIS, A. E. Control químico de isocas en lino. [**Chemical control of caterpillars on flax.**] *Idia* 1955, No. 87, 11-13.
Plot trials to study the control of *Heliothis armigera* and *Plusia nu* on flax were carried out at the experimental station of Balcarce, Argentina. Of 4 insecticides tested both as preventive and curative measures, Endrin, applied as a 19·5% emulsion at the rate of 400 g. of active principle per ha., was the best and gave good control of the pests.—E.B.O.

552† ZUEV, L. A. and GOLUBEVA, P. F. [**Utilization of the reserve phosphorus in seeds during germination.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1955, **104,** No. 6, 929-31, bibl. 7. [Moscow State Univ.]
The reserve form of phosphorus in seeds is chiefly phytin. This was discovered in *Sinapis nigra* seeds by V. I. Palladin in 1894, but the role of phytin in plant metabolism is still obscure. The authors' study is concerned with the question of phytin distribution in the plant and whether or not it is synthesized by the plant at the time of its intensive expenditure during seedling growth. Flax seedlings were grown in a culture solution with labelled P. The separate fractions of P compounds in the seedlings were analysed (method of Sokolov, *Him. Soc. Zemled.* No. 10, 1940, and Kursanov, *Biohimija* 3, 1938). From subsequent determinations of absorbed P the author concludes that phytin is not synthesized in the seedling, but its translocation to the seedling takes place simultaneously with that of other reserve substances from the seed. The phospho-sugars are partly translocated to the seedling and partly synthesized (though in less degree compared with other phospho-organic compounds) by the seedling itself from the P absorbed from the nutrient medium.—M.H.

553 HAGSAND, E. Hormonderivatens inverkan på stråsäd och lin efter besprutning vid olika tidpunkter. 3. Lin. **The effect of hormone derivatives on cereals and flax after spraying at different times. 3. Flax.** *K. Lantbr. Akad. Tidskr.* 1954, **93,** 5-6, 349-69, bibl. 38, English summary pp. 385-8.

In field trials during 1949-51 in Sweden, the flax varieties Herkules and Formosa and the linseed variety Valuta were treated with 3 l. Weedone (2,4-D preparation) per ha., or 7 l. Agroxone (MCPA preparation) per ha. The treatments were made at intervals not exceeding 4 days during the period from emergence to the completion of flowering. After spraying with either herbicide, growth abnormalities occurred on virtually all parts of the plants. Detailed accounts are given of leaf, stalk, capsule and root deformities. Leaf abnormalities mostly took the form of leaf whorls and fused leaves and followed spraying at an early growth stage. When the plants were 5-7 cm. high, no further abnormalities of these kinds occurred. In Weedone-treated plots, clustered leaves occurred where spraying was carried out when the plants were 10-20 cm. high. Stem abnormalities mostly took the form of kinks or S-bending. Stem kinks were associated with the leaf-whorl and fused-leaf types of abnormality and followed spraying at an early stage, when the plants had just emerged, up to when they were 7 cm. high. This type of damage appeared to be more severe in flax than linseed. S-bending occurred following treatment at relatively later growth stages, when the plants were 5 or more cm. high. The frequency and severity of S-bending varied with the growth stage of the plants when treated. High temperatures increased the severity of S-bending. Microscopic examinations of plants with kinked stems showed that some fibre bundles were normal and that others were split into small groups of fibres. Where the clustered leaf abnormality occurred, involving the placement of several leaf stalks in a ring around the stem, the fibre bundles were largely absent at that point. Enlarged cell cavities and thin cell walls were also common, particularly where Weedone was used. With plants suffering from S-bent stalks, disturbances in fibre bundles were common as were fibre cells with a large central cavity. Capsule abnormalities took the form of capsule fusion and sterility, and delayed capsule development. Capsule fusion occurred where plants were sprayed when about 5-10 cm. high. Capsule sterility and delayed capsule development occurred where the plants were sprayed at the pre-bloom and flowering stages; there was also a reduction in the 1000-seed weight and reduced seed germination, particularly where Weedone was used. Yield trials showed that the S-bend type of stem deformity caused the greatest reduction in fibre yield, particularly where the sprays were so timed as to result in the deformity occurring in the middle of the stems. With linseed, stem S-bending and capsule sterility caused the greatest seed-yield reduction. On the basis of these results, it is concluded that amounts of not more than 5 l. Agroxone per ha. should be applied to flax when 5 cm. high; with linseed, Agroxone, at rates between 5 and 8 l. per ha., should be applied at the same growth stage. [See also *Fld Crop Abstr.* 8 : 1180 and 9 : 97.]—P.J.B.

JUTE

554 MacMillan, W. G. and others. **Observations on the chemical composition of jute at different stages of plant growth.** *Sci. and Cult.* 1955, **20,** No. 11, 566-8, bibl. 6. [Indian Jute Mills Ass. Res. Inst., Calcutta]

Studies of *Corchorus capsularis* grown for 2 consecutive years led to the following tentative conclusions. In the bark layer simultaneous formation of lignin and cellulose occurs on the 9th day after germination. The lignin content of the plant generally increases with growth. The lignin content of the fibre, which is initially low, increases after 35 days and then remains practically constant until fully matured, an increment being observed in the over-matured stage. Holocellulose, lignin content and the methoxyl in lignin remain practically constant from 50 days onward to the fully matured stage. The fibre appears to become progressively coarser and stiffer as growth of the plant develops. —From authors' summary.

555 Das, B. K. and Dua, D. B. **Response of jute to nitrogen from different chemical fertilizers.** *Jute Bull.* 1955, **18,** No. 5, 124-5. [Jute Agric. Res. Inst., Barrackpore]

From 2 years' experiments in the application of different forms of N to both *Corchorus capsularis* and *C. olitorius*, ammonium sulphate was found to be the best fertilizer.—G.M.R.

OTHER

556 Datta, A. N. and others. **Effect of different spacings in row-cropping of *Hibiscus sabdariffa* var. *altissima*.** *Jute Bull.* 1955, **18,** No. 7, 181-4, bibl. 6. [Jute Agric. Res. Inst., Barrackpore, West Bengal]

Hibiscus sabdariffa is a substitute for jute and is being grown in areas unsuitable for jute cultivation. At Barrackpore, a spacing trial with this crop consisted of 5 different spacings between the rows, viz., 4″, 6″, 9″, 12″ and 15″, and 3 different spacings within the rows, viz., 2″, 4″ and 6″. The 15 different combinations were replicated 4 times in randomized blocks for 3 successive years. An increase in spacing within the row from 2″ to 6″ for any particular spacing between the rows resulted in a progressive increase in plant height, base diameter and fibre yield. An increase of spacing between rows for a particular spacing within the row resulted in a progressive increase of plant height and base diameter, and fibre yield was maintained up to a spacing of 12″ between the

rows. Close spacing resulted in lower plant height, base diameter and fibre yield.—P.M.G.

557 Sen Gupta, J. C. and Talukdar, S. **Investigation on the physiology of growth and development of *Crotalaria juncea* L. C. 12.** *Indian J. agric. Sci.* 1955, **25,** No. 1, 51-66, bibl. 28. [Presidency Coll., Calcutta]

Sunnhemp C. 12 from the State Agricultural Department, West Bengal, was sown in pots at intervals of one month for 12 months. Vegetative growth and development were greatly influenced by the date of sowing. With widely different sowing dates between April and September (150 days), flowering took place in September and up to the middle of October (44 days); the vegetative period thus became progressively shorter with the lateness of sowing. The growth in height, number of internodes and the circumference at the base of the stem became progressively shorter with the lateness of sowing, the sowings of October-February showing very poor growth, which is ascribed to the comparatively low temperature during these months. A favourable time for sowing this variety under the environmental conditions appears to be between the months of April and May. In other experiments, seeds were vernalized at low and high temperatures for different periods, and in one case 1 ppm. indole acetic acid was applied to the low-temperature treatment. In every case the pre-sowing temperature treatments produced distinctly late flowering compared with the control, but there was no significant difference between the treatments themselves, and the addition of the indole acetic acid was without effect on the flowering response. In a third series of experiments, plants were exposed to photoperiodic treatments of different lengths (ranging from 8 to 16 hr.) continuously until flowering and for different periods, at different seasons, at different stages and ages, and, in some treatments, after manuring with ammonium sulphate and potassium hydrogen phosphate. The plant showed distinct photoperiodic response and the variety was found to be a short-day plant. The climatic factors of the different seasons influenced its photoperiodic behaviour, and the effect was very remarkable in the 10-hr. and 12-hr. treatments. There was a clear induction effect. The addition of the fertilizers named had no effect on photoperiodic response. The plants responded earlier after the beginning of treatment when they were 30 and 45 days old.—G.M.R.

OIL CROPS

SESAME

558 Ghosh, B. N. **Abnormalities in cotyledon and leaf formation of til (*Sesamum indicum* Linn.).** *Sci. and Cult.* 1955, **20,** No. 12, 602-3, bibl. 5, illus. [State Agric. Res. Sta., Chinsurah, Hoogly]

559 Rao, M. B. S. and Subbiah, V. **A peculiarity of flowering in gingelly (*Sesamum indicum* L.).** *Madras agric. J.* 1955, **42,** No. 5, 181-2, bibl. 4. [Agric. Res. Sta., Tindivanam]

The character 1-3 flowers in a leaf axil (in contrast to the normal 1 flower in each axil) was found to occur in a large number of sesame varieties and types during the cold weather season November, 1953-February, 1954. A study of this phenomenon led to the conclusion that, although the character is an inherited one, its expression is largely controlled by seasonal conditions. The character is of economic value in that, with it, the production of capsules per plant is increased.—G.M.R.

LINSEED

560 Kolk, H. Aktuella svampsjukdomar hos linutsäde och betningens betydelse i kampen mot dem. **Fungus diseases in *Linum* seed and the value of chemical treatments for controlling them.** *Medd. 29. Stat. Cent. Frökontrollanst.* 1954, 47-61, bibl. 17, English summary p. 60.

In studies during the period 1949-53, the most frequent parasitic fungus species on linseed and flax seed was *Alternaria linicola*, followed by *Fusarium* spp. Linseed was commonly more heavily infected than flax seed. In trials during 1951-3, the Hg-containing fungicides Betoxin and Panogen and the Hg-free fungicides Special Panogen and Arasan were used for treating linseed and flax seed. The Hg-free materials were considerably more effective than Panogen and Betoxin in reducing seed infection and increasing seedling emergence. Seed harvested from plants grown from treated seed tended to have a lower frequency of fungus infection than where the original seed was not treated.—P.J.B.

561 Desveaux, R. and Kogane-Charles, M. Étude sur la germination des graines oléagineuses. [**A study on the germination of oil seeds.**] *Ann. Inst. nat. Rech. agron., Paris. Sér. A. Ann. agron.* 1955, **6,** No. 3, 337-61, bibl. 42, illus. [Inst. Nat. Agron., Paris]

Water-soluble organic acids, unrelated to the fatty acids, are formed during germination of oil-bearing seeds. They attain their maximum quantity between the 6th and 8th day of germination. Their identification by the classic methods of analysis is difficult, but separation by chromatography on silica has revealed aconitic, citric, fumaric, glycollic, lactic, malic, succinic and tartaric acids in *Ricinus communis* and *Linum usitatissimum* The origin and function of these acids are discussed.—D.B.

SUNFLOWER

562 Berdyšev, A. P. [**The biology of development of sunflower grown for oil, near Moscow.**] [Russian] *Agrobiologija* (*Agrobiology*) 1954, No. 6, 210-35, illus. [Nemčinovki Zonal Sci. Res. Inst. Grain Husbandry, Non-chernozem Belt]

Work on this crop has been carried out at the above Institute during 1947-8 and 1951-3. From the extensive studies of sunflower varieties grown in different regions of USSR, information has been obtained on cultural measures, duration of the vegetative period (in relation to latitude and season), yield of different varieties, thrashing percentage, oil content of the seed and disease resistance of varieties.—M.H.

RAPE

563 Rapin, J. Essais comparatifs de variétés de colza en 1954-1955. [**Comparative trials with colza varieties in 1954-5.**] *Rev. rom. Agric.* 1955, **11,** No. 11, 81-3, illus. [Sta. Féd. Essais Agric., Lausanne, Switzerland]

The following results were obtained from 1-year trials conducted at Changins-sur-Nyon. Lembke, whether from N. Germany or the Netherlands, gave the highest seed yields, but the oil content was low, possibly a result of the large size of the seed. The small-seeded Hambourg had a slightly lower yield but its oil content was higher than that of all the other varieties tested. It is a small plant, easily harvested, and it has the advantage of being earlier than other varieties. Dippe and Alsace gave lower gross yields than Lembke or Hambourg. The first, however, had a high oil content and the seed did not shed readily; the second had a medium oil content, and was particularly resistant to cold.—D.B.

564† Bonnemaison, L. Remarques sur la protection du colza contre le charançon des siliques. [**Observations on the protection of rape against the pod-weevil.**] *C.R. Acad. Agric. Fr.* 1955, **41,** No. 14, 603-9, bibl. 7.

The results are given of trials with several insecticides, in laboratory and field, for the control of pod-weevil (*Ceuthorrhynchus assimilis*) on rape. Only Toxaphene, which is not harmful to bees, is recommended. Application of Toxaphene solution should be at the rate of 3·75-4·5 kg. in 600-1000 l. of water per ha., or as a dust at the rate of 4·25-5 kg. per ha.—M.P.

565 Kasai, Z. and Okuda, A. **On translocation of mineral nutrients in higher plants. 2. Distribution of phosphorus at each stage of growth of rape and sesame.** [Japanese] *J. Sci. Soil, Tokyo* 1955, **26,** No. 7, 263-8, English summary p. 268. [Food Sci. Res. Inst., Univ. Kyoto, Japan]

LAND USE, SURVEYS AND MANAGEMENT

566† Jawetz, M. B. **An estimate of the number of farms in Wales classified according to their type of farming, and also of the economic results of Welsh farming.** *J. agric. Soc. Univ. Coll. Wales* 1955, **36,** 33-43, bibl. 2.

567† Nichterlein, E. Ertrags- und Strukturwandlung der bayerischen Landwirtschaft und die Entwicklung des landwirtschaftlichen Beratungswesens in Bayern. [**Changes in yields and in structure of Bavarian agriculture and the development of the Advisory Service in Bavaria.**] *Landw. Jahrb. Bayern* 1955, **32,** No. 3/4, 131-242, bibl. 46. [Techn. Hochsch., München, W. Germany]

Several aspects of agriculture in Bavaria are dealt with, e.g. soil and climate; land tenure and inheritance; land use; yields; cattle population; agricultural machinery; and research, advisory service and practice. The paper is illustrated with about 60 pages of statistics.—D.B.

568 Commission for Technical Co-operation in Africa South of the Sahara. **Topographical maps of Africa South of the Sahara.** *Publ. 15. C.S.A./C.C.T.A.* 1955, pp. 41. [London and Bukavu (Belgian Congo)]

This is a new edition, so far as it concerns topographical maps, of Publ. No. 4 of this series. It gives an inventory of the maps already in existence, their scale and brief notes on size, type and publisher. In the foreword it is stated that the number of maps relating to Africa south of the Sahara is increasing so fast that this edition will soon be incomplete and a new publication will become necessary in the near future. For this reason it has been decided to publish a new edition every 2 years.—D.B.

569† Commission for Technical Co-operation in Africa South of the Sahara. **Maps of Africa South of the Sahara. Part 2. Special subject maps.** *Publ. 17. C.S.A./C.C.T.A.* 1955, pp. 71. [London and Bukavu (Belgian Congo)]

This is a new edition of Publ. No. 4 of this series, so far as it concerns special maps; at the same time it is the second part of Publ. No. 15 [Abs. 568]. The special maps listed include those on soil, vegetation and forests, agricultural and animal husbandry, geology, climate, entomology, medicine, population and tribal boundaries, and communications. [Several important vegetation maps have been omitted.]—D.B.

570† SOUTHERN DEVELOPMENT INVESTIGATION TEAM. SUDAN GOVERNMENT. **Natural resources and development potential in the southern provinces of the Sudan. Preliminary report 1954. Vol. 1: Text; Vol. 2: Maps and diagrams.** 1955, pp. xxii + 262.

571 SAUTTER, G. Notes sur l'agriculture des Bakamba de la Vallée du Niari. [**Notes on the agriculture of the Bakamba of the Niari Valley (Middle Congo).**] *Bull. Inst. centrafr.* 1955, No. 9, 67-105. [Fac. Lettres, Strasbourg, France]

572† ACOCKS, J. P. H. **Agriculture in relation to a changing vegetation.** *S. Afr. J. Sci.* 1955, **52,** No. 4, 101-8.

After a brief review of the theory of succession in explanation of change in vegetation under the impact of European agriculture, an outline is given of the manner in which the vegetation of each ecological region of the Union [of S. Africa] has changed and how further change can be brought about for the benefit of agriculture. Special attention is given to the grasses. The view is supported that removal of a grass-cover from the soil can adversely affect climate outside the denuded area and so affect agriculture. The change in the vegetation is regarded as the result of replacing wild animals, subject to natural controls, by domestic animals not subject to these controls.—Author's summary.

573† ISBELL, R. F. **An investigation of the Callide Don and Dee Valleys [of Queensland].** *Tech. Bull. 3. Dep. Publ. Lands, Bureau Invest. Brisbane, Qd* 1954, pp. 38 bibl. 3 in text illus., 3 maps. [Received Aug., 1955]

The various aspects of land utilization in the Callide, Don and Dee Valleys, an area of 2400 sq. miles in the 25-30 in. rainfall zone of Queensland, are dealt with briefly. The soils, vegetation, climate, hydrology, agricultural and pastoral industries of the region, and possible future developments, especially in the use of irrigation for pastures and crops, are considered. Maps are included of soil type and associated vegetation, water resources and land use of the area.—M.P.

574† COSTIN, A. B. **High mountain catchment in Victoria. The catchment of Eildon Reservoir.** *Aqua, Vict.* 1955, **7,** No. 1, 9-20, illus.

A brief discussion is given of the reconnaissance ecological survey of the high mountain catchments of Victoria, in relation to land use, completed by the Soil Conservation Authority. The three major environments occurring there are montane, sub-alpine and alpine and the communities to be found are mentioned. Burning and over-grazing are amongst the factors contributing to soil erosion and deterioration of the bogs over a large area with a consequent serious reduction in the water supply of the catchment area during the summer months. Corrective measures are recommended such as protection from fire and grazing, soil stabilization and conservation.—M.P.

FARMING SYSTEMS AND PRACTICES

575† HURWITZ, S. **The cereals in the crop rotation.** *Ktavim* 1955, **4,** No. 3, 5-24. [Agric. Res. Sta., Rehovot, Israel]

In two large-scale trials, carried out from 1944-8, various 4-crop rotations of cereal and leguminous fodder crops were tested to evaluate the effects of cereals in such rotations, and to determine the best type of rotation. The most effective place for wintersome-sorghum in the crop sequence was also investigated and, in a separate series of trials, both cereals and legumes were grown for grain, hay, and fodder to determine the best use of the grain crops in the rotation. Results were evaluated on the basis of the "rotational value" of the crop, i.e., its effect on the soil as expressed solely by the yield of succeeding crops. Wheat, oats, maize, penicillaria [= *Pennisetum*], wintersome-sorghum, and sunflowers (since the latter do not differ greatly from the cereals) were compared with field peas and cowpeas; in the second trial, *Lathyrus ochrus*, vetch, and horse beans were used for comparison. It was concluded that the rotational value of the cereals is much less than that of the legumes, and a succession of cereal crops is markedly detrimental to soil fertility. When cowpeas intervene between oats and maize, the detrimental effects of a succession of cereal crops are somewhat mitigated. While there are no significant differences among the winter legumes as to rotational value, the cereals differ considerably in the degree to which they deplete the soil; maize has the least harmful influence on subsequent crops, with sunflowers, penicillaria, and wintersome following in the order given. Winter

some-sorghum, if followed by a legume, is not detrimental to succeeding crops.—From author's summary.

576† Morgan, W. B. **Farming practice, settlement pattern and population density in south-eastern Nigeria.** *Geogr. J.* 1955, **121,** Pt. 3, 320-33, bibl. 9, illus.

577† Commission for Technical Co-operation in Africa South of the Sahara. **Mechanisation of agriculture. Inter-African Conference.** *Rep. A.3. C.S.A./C.C.T.A.* 1955, pp. 41. [Entebbe]

578† Cabral, A. L. Queimadas e pousios na Circunscrição de Fulacunda em 1953. [**Burning the vegetation and resting the soil in Fulacunda district (Portuguese Guinea) in 1953.**] *Bol. cult. Guiné portug.* 1954, **9,** No. 35, 627-43, illus.

With a view to studying the evolution of native agriculture, the respective extent of burnt areas, rested areas and cultivated areas was measured in 347 family holdings, grouped according to tribes, in Fulacunda, in 1953. Tables show data of cultivated, burnt and rested areas, expressed as total and percentage areas, for different regions and different tribes. In Fulacunda, as a whole, the cultivated area was 18,615 ha., the burnt area 4409 ha. and the rested area 2926 ha. This indicates a trend towards a reduction in the soil available for cultivation, decrease in soil fertility and increase in soil erosion.—E.B.O.

579 Robinson, J. B. D. and others. **A cultivation system for ground-water (vlei) soils.** *E. Afr. agric. J.* 1955, **21,** No. 2, 69-76, bibl. 5, illus. [Dep. Agric. Kenya]

Results of preliminary crop trials in 1954 with the camber bed system of cultivation of vlei soils indicate the high potential value of these soils for crop and grass production. Fertilizer applications, in particular cattle manure, were essential for good yields. Maize cob yields from fertilized plots varied from 15-43 cwt. per ac., compared with 7 cwt. per ac. from the unfertilized plots; similarly stover yields were 1·3-5·7 tons per ac. compared with 0·9 tons per ac. from the control plots. The construction of the camber beds and the system of cultivation on vlei soils are described in detail.—M.P.

580 Toms, A. M. **Spraying techniques and machinery in the Sudan Gezira. 1.** *World Crops* 1955, **7,** No. 8, 306-8, 324, bibl. 3, illus.

The application of insecticides to cotton crops in the Sudan Gezira scheme by land machines and aircraft is discussed. The use of fixed-wing aircraft for applying low-volume sprays at the rate of 0·5 lb. DDT emulsion in 2 gal. per feddan [1 feddan =1·038 ac.] enabled 490 feddans to be sprayed in a 5 hr. day, with 100% efficiency from the aircraft, but empty flying time was 71%. Reduction of the spray quantity of 0·5 gal. per feddan increased the output per 5 hr. day by 84% and reduced the empty flying time to 33%. A straight oil concentrate of DDT was used. Further reductions in the quantities of insecticide applied and the use of drift spraying to save the number of runs are considered for this area.—M.P.

581† Baltin, — Flugzeuge in der Schädlingsbekämpfung. [**Aircraft in pest control.**] *Dtsch. Landw.* 1955, **6,** No. 11, 543-5, bibl. 9, illus.

A resumé is given of various types of aircraft used in different countries to control fungal and insect pests on crops.—D.B.

582 Gilbert, Deborah. **The use of sprinkler irrigation systems in Central and South America.** *World Crops* 1955, **7,** No. 8, 317-19, illus.

The value of sprinkler irrigation has been clearly demonstrated by increased yields of many crops, including maize, wheat, rice, cotton and soyabeans. —M.P.

583† Higgs, E. D. and Burton, M. V. **Progress of investigations on land development on Southern Yorke Peninsula.** *J. Dep. Agric. S. Aust.* 1955, **59,** No. 3, 114-21, illus.

Experiments indicate that using a barley/pasture/barley/pasture rotation, with 2 cwt. superphosphate and 20 lb. manganese sulphate per ac. applied to the crop, and 2 cwt. superphosphate per ac. applied to the pastures, in the first few years of the rotation, is the best way of developing this country.—M.P.

584† Rui, D. and Romanelli, O. La difesa antigrandine in Italia nell'anno 1954. [**The anti-hail defence in Italy in 1954.**] *Agricoltura d. Venezie* 1955, **9,** No. 11, 568-88, illus. [Uff. Tec. Antigrandine, Verona]

Anti-hail defence measures have increased rapidly during the last few years in Italy, where a National Union for Hail Control has been founded. In 1954, the experimental areas for anti-hail defence were 113, almost all in northern Italy. Active defence took place in 104 of these areas, no hail-producing storms having occurred in the others. The cases in which action was taken were 853, and the total number of rockets fired 97,553. A summary of replies to questionnaires how that hail control by rockets was effective on the whole, but that improvements are needed in the rockets employed, the organization, etc. In particular, rockets reaching greater heights than those usually employed are often needed. It is considered that the cost of this defence can be met by the farming communities.—E.B.O.

SOIL AND WATER CONSERVATION

585 SPENCE, M. T. **Wind erosion in the Fens.** *Met. Mag., Lond.* 1955, **84,** No. 1000, 304-7, bibl. 1, illus.

A "blow" which lifts the top soil and causes widespread loss of soil occurs about once in 5 years in the Fens of E. Anglia. The storm of 4-5 May, 1955, resulted in severe blowing. Some of the causes and effects of this are discussed. Instances are given of successful protective practices.—C.L.S.

586† EDELMAN, C. H. and EEUWENS, B. E. P. **Bibliography on land and water utilization and conservation in Europe.** *Pap. 55/11/7708. FAO* 1955, pp. 347.

This compilation was prepared under the auspices of the Sub-Committee on Land and Water Use of the European Committee on Agriculture. It is divided into 7 sections dealing, respectively, with : general and agricultural geography and maps ; climate ; soils ; vegetation, hydrology and hydrography ; land reclamation, drainage, irrigation ; the redistribution and consolidation of fragmented holdings ; soil erosion and soil conservation.—P.J.B.

587† FOURNIER, F. Les facteurs de l'érosion du sol par l'eau en Afrique Occidentale Française. [**Factors in the erosion of soil by water in French West Africa.**] *C.R. Acad. Agric. Fr.* 1955, **41,** No. 15, 660-5.

The ways in which climate, man and soil type may influence the effects of rainfall on soil erosion are discussed with reference to soils occurring in tropical French West Africa which are unprotected, or have a forest cover or are encrusted at, or near, the surface.—M.P.

588 ICHINOHE, S. and KUDO, K. **Studies on the relation of crops and the cropping system to soil erosion. 4. On the critical stage of crops for erosion. 5. Two-year rotation of sawa-millet, wheat and soybean.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 293-4 and 296, English summary. [Tohoku Agric. Exp. Sta.]

The rotation indicated afforded effective protection, the soyabean being intersown before the wheat was harvested.—G.M.R.

589 GUENNELON, R. Conservation des sols et lutte contre l'érosion à L'Ile de la Réunion. [**Soil conservation and the struggle against erosion in Reunion Island.**] *Ann. Inst. nat. Rech. Agron., Paris. Sér. A. Ann. agron.* 1955, **6,** No. 3, 423-97, bibl. 13, illus., text maps. [Centre de Recherches Agronomiques du Sud-Est, Avignon, Vaucluse, France]

The types of erosion met with and their causes are discussed and illustrated. The cure lies chiefly in replacing the vegetal cover by reafforestation on steep slopes and by strip cropping on gentle slopes with bands of a cover crop, e.g. *Vetiveria zizanioides*, at intervals between the crops, e.g. geranium, maize, beans, lentils. The band of cover crop should be introduced at each level on the slope where the first rill forms and continued until there is no danger of erosion before introducing the next crop. Where the slope is more than 5-6%, or the rainfall greater than 2500 mm., the land should be used for permanent pasture. Ploughing-up to introduce a temporary pasture into a crop rotation is out of the question except in the sugar cane zones on level land and on gentle slopes where the introduction of legumes such as *Melilotus alba, Lespedeza sericea* or *Lotus corniculatus* every 7 or 8 years is justified.—D.B.

590† NEWMAN, J. C. **Tumut Catchment area—survey of vegetation and erosion. Part 5.** *J. Soil Conserv. N.S.W.* 1955, **11,** No. 4, 207-22, bibl. 30, illus.

In this concluding article, soil erosion occurring in the area as a result of construction damage and through introduced erosive agents, such as fire, the grazing animal and gold mining, is discussed. Recommendations are put forward for the conservation of soil and vegetation in the catchment area.—M.P.

591† SLESS, J. B. **Coastal sand drift control—recent progress at experimental centres.** *J. Soil Conserv. N.S.W.* 1955, **11,** No. 4, 172-86, bibl. 7, illus.

The work in recent years on sand stabilization at Port Kembla, Port Macquaire, Iluka and Entrance North (Tuggerah Lakes), New South Wales, is briefly reviewed.—M.P.

592† KALESKI, L. G. **The flood problems in New South Wales.** *J. Soil Conserv. N.S.W.* 1955, **11,** No. 4, 196-200, illus.

Particular reference is made to run-off, recorded at research stations, of the flood rain of February 1955 in New South Wales and to the importance of adequate soil conservation work.—M.P.

WEEDS, WEED CONTROL AND WEEDKILLERS

593† Dubois, L. La jacinthe d'eau au Congo belge. [**The water hyacinth in the Belgian Congo.**] *Bull. agric. Congo belge* 1955, **46,** No. 4, 893-900, bibl. 12, illus.

The water hyacinth (*Eichhornia crassipes*) was recently introduced, probably about 1950-1, into the Belgian Congo as an ornamental plant. Although it increases only by vegetative reproduction in that country, it has spread along the Congo River and some of its tributaries. Control of the water hyacinth in the Belgian Congo consists of preventive measures to check its spread and the mechanical clearance of limited areas. Information is given on the use of herbicides against this weed in other countries. The water hyacinth can be used for feeding cattle and especially pigs, and for making compost. As its leaves contain 95% of water they should be left to dry for a few days before feeding them to animals. A compost made from water hyacinth contains the following fertilizers (percentages on a dry-matter basis): N 2·05, P_2O_5 1·10, K_2O 2·50, CaO 3·91.—E.B.O.

594† van der Walt, J. L. **The camel-thorn bush.** *Fmg in S. Afr.* 1955, **30,** No. 354, 401-3, illus.

Of several hormonal and chemical solutions used for the control of camel-thorn bush (*Alhagi camelorum*), a 1·5% arsenic pentoxide solution gave best results. It is recommended that eradication work should be undertaken between mid-December and the end of May. The tops of the bushes are bent over and then dipped in the solution and left in it for 36-48 hr. Stock should be kept away from the areas for a time because of the residual effect of the arsenic pentoxide. No regrowth was visible after similar treatment with a 1% 2,4,5-T solution.—M.P.

595† Meadly, G. R. W. **Weeds of Western Australia. Onion-weed or asphodel (*Asphodelus fistulosus* L.).** *J. Dep. Agric. W. Aust.* 1955, **4,** No. 5, 529-31, illus.

Control of this perennial weed can be effected by regular cultivation of land, or by competition from vigorous perennial grasses and legumes such as *Phalaris tuberosa* and lucerne. No suitable or economical hormonal or chemical herbicide has yet been found.—M.P.

596† Orchard, H. E. **Sand rocket or Lincoln weed (*Diplotaxis tenuifolia,* (L) DC).** *J. Dep. Agric. S. Aust.* 1955, **59,** No. 4, 138-9, bibl. 1, illus.

A description is given of this weed which occurs in some areas of South Australia on cultivated and fallow lands and causes reduction in cereal crop yields and in the carrying capacity of pastures. Control by thorough cultivation is successful if carried out before the plant is well established. Control is also effective when a spray of 2,4-D ester is applied at 1 lb. a.e. in 12-20 gal. of water per ac. The addition of 1 lb. borax per ac. to the water before mixing the 2,4-D appears to promote more efficient action by the 2,4-D in some districts.—M.P.

597 Narayanan, T. R. and Meenakshisundaram, D. ***Solanum elaeagnifolium.* Cav. A new weed of cultivated land in Madras.** *Madras agric. J.* 1955, **42,** No. 11, 482-4, bibl. 3, illus. [Agric. Res. Inst., Coimbatore, India]

A brief note is given on *S. elaeagnifolium*, a deep-rooted perennial species introduced into Madras State.—P.J.B.

598† Frankton, C. **Weeds of Canada.** *Publ. 948. Canada Dep. Agric.* 1955, pp. 196, illus.

This publication is intended to provide a guide for the identification of the more important weed species of Canada. A total of 205 species is described and complete, or partial, drawings are given of 133 species. The descriptions include common names, growth habit, morphology, origin, distribution in Canada, habitats, observations on noxious characteristics as weeds and brief notes on similar species.—P.J.B.

599 Kasperlik, H. Vergleichende physiologische Untersuchungen an 2,4-D-empfindlich und resistenten Pflanzen. [**Comparative physiological investigations of 2,4,D-sensitive- and-resistant plants.**] *Flora, Jena* 1955, **142,** No. 2, 307-42, bibl. 45. [Bot. Inst., Univ. Munich, W. Germany]

Comparative studies were made on the effect of 2,4-D on the carbohydrate metabolism and water economy of plants sensitive, moderately sensitive and resistant, to 2,4-D. Sensitive plants included *Vicia faba* and *Sinapis alba*, moderately-sensitive plants included *Capsella bursa-pastoris* and *Matricaria inodora*. *Avena sativa* was the resistant plant used. The effect of root treatments was similar to that of foliar treatments. The water content of treated sensitive plants increased markedly, whilst in oats no such effect was noted. In the stems and leaves of sensitive plants the content of high-polymer carbohydrates decreased and that of reducing sugars increased; in the roots, the contents of both decreased. In the case of oats, only very young plants showed any metabolic changes following treatment. In all plants, age had a considerable influence on the effect of 2,4-D. Transpira-

tion in sensitive plants fell sharply after treatment and normal stomatal movements were upset. These results showed that 2,4-D affected enzyme activity, cell metabolism and the water economy of the plants.—P.J.B.

600 MACIEJEWSKA-POTAPCZYK, W. **The action of 2,4-D on some of the enzymes of the stomatal cells.** [Polish] *Acta Soc. Bot. Polon.* 1955, **24,** No. 3, 639-45, bibl. 14, illus., English summary p. 644.

601 JAWORSKI, E. G. and others. **Studies in plant metabolism. 5. The metabolism of radioactive 2,4-D in etiolated bean plants.** *Pl. Physiol.* 1955, **30,** No. 3, 272-5, bibl. 11. [Oregon State College, Corvallis]

The study was undertaken to obtain information concerning the effect of sugars and other chemicals, including sulphanilamide and indoleacetic acid, on the translocation of 2,4-D in etiolated plants. Movement of 2,4-D from leaf to stem was induced by sugars, the most effective being sucrose and glucose.—D.B.

602 VIDME, T. Forsøk med natriumklorat. 2. Om faktorer som har innflytelse på virkningen og ettervirkningen av natriumklorat som ugrasdreper. [**Experiments with sodium chlorate. 2. On factors influencing the effectiveness and residual effect of sodium chlorate as a weedkiller.**] *Meld. Norges LandbrHøgsk.* 1954, **34,** No. 4, 287-343, bibl. 75, illus., English summary pp. 339-41.

The trials reported were carried out during 1942-7 with the main object of determining the neutralizing effect of calcium nitrate, sodium nitrite, sodium chloride, iron sulphate, each alone or in combination with magnesium chloride, and lime, on the phytotoxicity of sodium chlorate. Also studied were the effects of sodium chlorate on different weed species and the influence of soil type, soil-nitrate content, soil moisture supply and time of application on the effect of sodium chlorate on crops. Both pot and field trials were conducted. The simultaneous application of calcium nitrate and sodium chlorate in spring to oats resulted in marked reduction of the phytotoxicity of sodium chlorate in pot and field trials, though calcium nitrate was not able to neutralize completely the effects of sodium chlorate, particularly where the calcium nitrate was applied after the sodium chlorate had already caused symptoms of toxicity in the oats. In field trials with potatoes, there was evidence that applications of calcium nitrate after planting the crop were not able to prevent absorption of sodium chlorate applied during the previous autumn and which was still present at soil depths below those reached by the calcium nitrate. Growing oats, *Agropyron repens* and *Sonchus arvensis* in a humus soil under good conditions for nitrifying resulted in less injury from sodium chlorate than where clay or sandy soil was used. In pot trials with oats, but not in field trials, with mixtures of oats and peas, sodium nitrite markedly neutralized the effect of sodium chlorate by virtue of the nitrification of sodium nitrite to nitrate in the soil. Sodium chloride, lime, ferrous sulphate or ferrous sulphate + magnesium sulphate had no neutralizing effects on sodium chlorate. Treatment with sodium chlorate during the period from late Oct. to early Nov. resulted in better control of *A. repens* and *S. arvensis* than did earlier treatments, but the effect on succeeding crops was more serious. For a 90-100% kill, the following amounts of sodium chlorate per decare, as found in cylinder and field trials, were required: for *Ranunculus repens* 5-15 kg., for *Deschampsia caespitosa, Anthriscus silvestris* and *Urtica dioica* 15-30 kg., for *Tussilago farfara, Cirsium arvense, Stachys palustris, Pteridium aquilinum* and *Aegopodium podagraria* 25-50 kg., and for *Equisetum arvense, Agropyron repens* and *Filipendula ulmaria* 30-60 kg. Potatoes appeared to be one of the best crops for growing after autumn treatments with sodium chlorate, partly because hoeing them made possible the use of rather less sodium chlorate than in other crops and partly because potatoes were relatively tolerant of sodium chlorate. Heavy treatments with a nitrate compound in spring were able to neutralize much of the toxic effects of sodium chlorate applied during the previous autumn. The place of sodium chlorate as a herbicide in farming practice is discussed. This material is not suited for controlling annual weeds in cereals, but for use against a variety of perennial weeds, and for complete elimination of all vegetation, sodium chlorate is regarded as still one of the most effective.—P.J.B.

603 LANGSTON, R. **Herbicidal action. Activities and residues of sulfur-35-labeled bis (ethyl xanthic) disulfide.** *J. agric. fd Chem.* 1955, **3,** No. 10, 849-51, bibl. 4. [Purdue Univ. Agric. Exp. Sta., Lafayette, Ind.]

A report is given on the synthesis of bis (ethyl xanthic) disulphide (known commercially as Herbisan) containing S^{35} as a tracer, and of its herbicidal action. Tests in which this herbicide was used as a pre- and post-emergence treatment for a number of vegetable crops, including potatoes and sweet-corn, showed that it was not absorbed by the roots and that, except in the case of cabbage and cauliflower, there was no detectable translocation of the material beyond the original contact area where it was applied to the leaves. This material was primarily a contact herbicide.—P.J.B.

CROP BOTANY

604 NIKKI, I. **Studies on root-breaking in certain crop plants caused by the formation of icicle-layers in the ground and on protection methods against them. 3. Formation of ground cavity and its relation to the plant roots.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1955, **23,** No. 4, 283-4, illus., English summary. [Kanto-Tosan Agric. Exp. Sta.]
The mechanism of ground-cavity formation is outlined. Plant roots can be severed by such cavities. —G.M.R.

605† MEIDNER, H. **The determination of paths of air movement in leaves.** *Physiol. Plant.* 1955, **8,** No. 4, 930-5, bibl. 7, illus. [Bot. Dep., Univ. Natal, Pietermaritzburg]

606† ARLAND, A. Die Transpirationsintensität der Pflanzen als Grundlage bei der Ermittlung optimaler acker -und pflanzenbaulicher Kulturmassnahmen unter besonderer Berücksichtigung von Pflanzenanalysen. [**The transpiration intensity of plants as a basis for ascertaining the optimum crop and soil cultivation measures, more especially as regards chemical analysis of plants.**] [Contained in] *Plant analysis and fertilizer problems. A colloquium arranged by Inst. Rech. Huiles et Oléagineux (8th Internat. Bot. Congr.)* 1954, 35-47, bibl. 22, illus. [Leipzig, E. Germany]

607 VIRGIN, H. I. **A new method for the determination of the turgor of plant tissues.** *Physiol. Plant.* 1955, **8,** No. 4, 954-62, bibl. 8. [Bot. Lab., Univ. Lund, Sweden]
A method for determining the turgor of plant tissues is described. The method is based on the resonant frequency of vibration of a solid body. The plant tissue under investigation is fitted with a small piece of steel wire at one end, and held firm at the other. The wire is caused to vibrate by placing it between the poles of an electromagnet energized by an oscillator. Changes in the rigidity of the plant tissue are reflected in changes in the resonant frequency of vibration of the steel wire. Such changes in the resonant frequency of vibration constitute an index of turgor of the plant tissue and provide an effective means for measuring the osmotic value of the cell sap and for determining cell permeability.—P.J.B.

608† THAINE, R. and WALTERS, Madeline C. **Experiments on the application of autoradiographic techniques to the study of problems in plant physiology.** *Aust. J. biol. Sci.* 1955, **8,** No. 3, 354-68, bibl. 18, illus. [Univ. Melbourne]
The method developed enables the recording of single β-particles emitted from plant tissues 5-7μ thick ; it allows resolution of the order of 1μ and magnification up to $\times$ 1500. The experimental procedures for the administration of $^{14}CO_2$ to the plant ; tissue fixation and dehydration ; spreading paraffin sections ; and photographic processing is given and discussed. Illustrations of macroscopic and microscopic autoradiography are studied.—M.P.

609† ALLAN, A. H. and MCCREE, K. J. **Integrating meters for comparing light intensities in plant growth studies.** *J. Sci. Instrum.* 1955, **32,** No. 11, 422-4, bibl. 9, illus. [Dominion Phys. Lab., D.S.I.R., New Zealand]
The two instruments described were designed, for use in places where one type of plant grows underneath another, e.g., short clover under long grass, to measure the proportion of the light incident on the top cover which reached a horizontal surface in the under-growth.—M.P.

610† ARTHUR, I. P. **An evapotranspirometer.** *Aust. J. agric. Res.* 1955, **6,** No. 5, 707-12, bibl. 3, illus. [Cent. Exp. Workshops, C.S.I.R.O., Maribyrong, Victoria]
The equipment, designed to measure evapotranspiration from within a growing crop, is described in detail. Changes in weight can be measured with an accuracy of 0·01%. Results indicate that this equipment, the C.E.W. evapotranspirometer, enables small changes in weight of the container to be measured at intervals during the day, even during periods of low evaporation.—M.P.

611† BAUSERMAN, H. M. and OLSON, R. F. **Plant assay. Analyses of plant materials using EDTA salts as solubilizers.** *J. agric. fd Chem.* 1955, **3,** No. 11, 942-6, bibl. 24. [Res. Lab., American Crystal Sugar Co., Rocky Ford, Colorado]
The method reported makes use of EDTA salts for extracting ground or pulped plant materials. The extracts obtained enable rapid analyses of Ca, K and Na to be carried out and also provide solutions suitable for the analysis of sugars, amino acids and other soluble organic compounds.—P.J.B.

612† REIFER, I. **A micromethod for the determination of malic acid in plant material.** *Bull. Acad. polon. Sci.* 1955, **3,** No. 6, 207-10, bibl. 4.
By the method described, the time required for the complete determination from biological material

does not exceed 2 hours. The method is accurate to within ±8% for amounts below 2μ g., and ±4% for amounts between 2-16μ g.—From author's discussion.

613† THOMAS, A. J. and SHERRAT, H. S. A. **The isolation of nucleic acid fractions from plant leaves and their purine and pyrimidine composition.** *Biochem. J.* 1956, **62,** No. 1, 1-4, bibl. 28. [Agric. Chem. Dep., Univ. Coll. Wales, Bangor]

The leaves of sugar-beet, kale, rye, bracken and clover were used.—M.P.

614† BHUVANESWARI, K. and SULOCHANA, C. B. **Assay of root exudates.** *Curr. Sci.* 1955, **24,** No. 11, 376-7, bibl. 7, illus. [Bot. Lab., Univ. Madras]

Brief descriptions are given of two techniques for assaying root exudates. In the first, the seed is germinated and the seedling grown in Roux tubes in 0·1 N Richard's solution without sucrose. The nutrient solution is withdrawn after 14 days' seedling growth, autoclaved, and can then be subjected to qualitative and quantitative bioassay of vitamins in the root exudate, under aseptic conditions. The second technique enables seedlings to be grown under controlled conditions in natural soils and permits the extraction of root exudates without disturbing the root system.—P.J.B.

615† TROCMÉ, S. Quelques exemples de contribution de l'analyse des plantes au diagnostic des insuffisances de production des cultures. [**Some examples of the contribution of plant analysis to the diagnosis of low yields of crops.**] [Contained in] *Plant analysis and fertilizer problems. A colloquium organized by the Inst. Rech. Huiles et Oléagineux (8th Internat. Bot. Congr.)* 1954, 111-20. [Sta. Cent. Agron., Versailles, France]

616† NICHOLAS, D. J. D. **Rapid chemical tissue tests for determining the mineral status of plants.** [Contained in] *Plant analysis and fertilizer problems. A colloquium organized by Inst. Rech. Huiles et Oléagineux (8th Internat. Bot. Congr.)* 1954, 78-80, bibl. 7. [Long Ashton Res. Sta., Univ. Bristol]

617† MITCHELL, R. L. **The spectrochemical analysis of plant material.** [Contained in] *Plant analysis and fertilizer problems. A colloquium organized by Inst. Rech. Huiles et Oléagineux (8th Internat. Bot. Congr.)* 1954, 48-67, bibl. 85. [Macaulay Inst. Soil Res., Aberdeen]

618† FRANC DE FERRIÈRE, P. J.-J. Le potassium dans la nutrition de la plante et les engrais potassiques. [**Potassium in the nutrition of the plant; the potassium fertilizers.**] [Contained in] *Plant analysis and fertilizer problems. A colloquium organized by the Inst. Rech. Huiles et Oléagineux (8th Internat. Bot. Congr.)* 1954, 90-100, bibl. 6. [Soc. Commerciale des Potasses d'Alsace, Mulhouse, France]

In studies with wheat, potato, lucerne and herbage plants a triple role of K, when given as a supplementary fertilizer, has been demonstrated by improvements in: (1) N assimilation, which is expressed in better all-round growth; (2) the chlorophyll functions, evident from the increase in utilizable starch products e.g.; (3) turgescence of cells resulting in an improved physiological state and consequent increase in yields.—D.B.

619† KATALYMOV, M. V. [**Micro-element content in crop yields.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci., USSR)* 1955, **104,** No. 4, 584-6. [Sci. Inst. Fert. and Insectofungicides]

In order to study the amounts of micro-elements which occur in plants and their total expenditure when crops are harvested, two field experiments were carried out with several plants (including wheat, barley, oats, flax, sunflower, sugar- and fodder-beets, lupin, lucerne, and other herbage plants). The first experiment was on chernozem in a locality of the Harjkov Province. The plants were grown under uniform conditions on small plots (20m.^{2}) and harvested at the stage of full ripeness. They were then analysed for contents of B, Mn, Cu and Zn, the colorimetric method being used for determination of B, Cu and Mn, while Zn was determined by two methods (polarigraphic and colorimetric) which gave similar results. The results show that the crops differ greatly from each other in their content of micro-elements both with regard to unit of the dry matter in the plant and in the total harvest. The least amount of B, for example, was in the grain of the cereals (2-3 mg./kg. dry matter), and the greatest quantity was in the leaves of sunflower, in lucerne, leaves of the beets and in *Vicia* sp. hay (35-72 mg./kg.). The content of Mn varied between 18-260 mg./kg., and Cu varied from 1·5-8·5 mg./kg. dry matter (seed containing a greater quantity of this element than the straw, [in contrast to the proportion of B or Mn in seed and straw]). The content of Cu in the total harvest of the plants varied between 7·3-52·5 g./ha. Zn content varied between 16-65 mg./kg. dry matter. The second experiment was made on medium podzolic, heavy clay soil in the Moscow Province. B content in dry matter of the plant was somewhat lower than that of the chernozem, but, on the contrary, Mn was much greater, reaching 770 mg./kg. in beet leaves. Cu and Zn contents were also greater in harvests from the podzolic clay.—M.H.

620† GÜNTHER, E. and MESCHKAT, Hilde. Die Bedeutung der Spurenelemente und ihr Einfluss auf das Mikrobenleben des Bodens und das Wachstum höherer Pflanzen im Jugendstadium. [**The importance of trace elements and their influence on the microbial activity of the soil and the growth of early stages of higher plants.**] *Dtsch. Landw.* 1955, **6,** No. 10, 498-501, bibl. 3.

Measurements were made of the growth in length of the roots of seedlings of cress, lucerne, carrot and common millet (*Panicum miliaceum*) when under the influence of B, Co, Ni, Zn, Cu, Mn, Al, Mo, I, Br, and F at concentrations of 0·1, 0·01, 0·001 and 0·0001%. At the lowest concentrations B and Mn had a strongly stimulating action ; at the higher concentrations there was on the whole a toxic effect, the toxicity decreasing in this order : Cu, B, Co, Al, F, Zn, Ni, Mo, Mn, I, Br.—D.B.

621† WALLACE, T. **The application of trace elements to crops.** [Contained in] *Plant analysis and fertilizer problems. A colloquium organized by Inst. Rech. Huiles et Oléagineux (8th Internat. Bot. Congr.)* 1954, 22-30, bibl. 57. [Long Ashton Res. Sta., Univ. Bristol]

A resumé is given of the methods employed in applying Fe, Mn, B, Cu, Zn, and Mo to various crops, including pastures and cereals.—D.B.

622† ŠKOLJNIK, M. Ja. [**The biological role of boron in plant organisms.**] [Russian] *Usp. Sovrem. Biol. (Adv. mod. Biol., Moscow)* 1955, **40,** No. 2 (5), 211-29, bibl. 99.

A review article.

623† SCHARRER, K. and others. Die Borbestimmung mit Chinalizarin in Pflanzen, Böden und Düngemitteln. [**The estimation of boron in plants, soils and fertilizers by means of quinalizarin.**] *Landw. Forsch.* 1955, **8,** No. 1, 26-32, bibl. 6, illus. [Justus-Liebig Hochsch., Giessen, W. Germany]

624 WARINGTON, Katherine. **The influence of high concentrations of ammonium and sodium molybdates on flax, soyabean and peas grown in nutrient solutions containing deficient or excess iron.** *Ann. appl. Biol.* 1955, **43,** No. 4, 709-19, bibl. 14, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

Ammonium molybdate supplying 20 or 40 ppm. Mo prevented chlorosis caused by low iron supply in young flax plants, but sodium molybdate was effective only at the higher concentration. Temporary darkening of the green colour of the shoots was also produced by 40 ppm. Mo in iron-deficient soyabean and pea plants, but was soon followed by more severe chlorosis. Symptoms of molybdenum toxicity always developed when 40 ppm. Mo were given, whether or not the intensity of chlorosis was reduced. With an increase in iron supply, a reduction in molybdenum toxicity symptoms was confirmed in soyabean and peas. In flax the higher level of iron eventually proved excessive unless it was combined with 40 ppm. Mo. High molybdenum thus seemed able to counteract both iron deficiency and toxicity in this plant. High iron reduced the molybdenum content (ppm./dm.) of both shoot and root in soyabean, peas and also in flax provided the iron was not excessive. High molybdenum usually reduced the iron content of the shoot, but markedly increased it in the root. Molybdenum-induced chlorosis could thus be partly attributed to inhibition in iron translocation, but the beneficial effect of high molybdenum or high iron on colour was not obviously correlated with the analytical data.—Author's summary.

625 BRIAN, P. W. and others. **A physiological comparison of gibberellic acid with some auxins.** *Physiol. Plant.* 1955, **8,** No. 4, 899-912, bibl. 21. [I.C.I. Ltd., Akers Res. Labs, Welwyn, England]

Comparisons were made of the physiological effect of gibberellic acid, indolylacetic acid and a number of other auxins, as evidenced by wheat root coleoptile extension, pea stem section extension, water uptake by potato tuber tissue, cress root growth, inhibition of lateral buds on pea seedlings, dormancy of potato tubers, *Coleus* petiole abscission and pea root initiation. Gibberellic acid showed a marked capacity to break the dormancy of potato tubers, with evidence of loss of apical dominance, which was in contrast to the dormancy-inducing effect of indolylacetic acid. Gibberellic acid was considered to be an auxin, or auxin precursor, in the sense of Tukey and others (1954), who stated that an auxin was to be defined primarily by its capacity to induce elongation in shoot cells of intact plants or in wheat coleoptiles or pea stem sections. Gibberellic acid did not elicit many of the plant responses caused by indolylacetic acid, particularly those involving cell division.—P.J.B.

626† GORDON, S. A. and WEBER, R. P. **Studies on the mechanism of phytohormone damage by ionizing radiation. 1. The radiosensitivity of indoleacetic acid.** *Pl. Physiol.* 1955, **30,** No. 3, 200-10, bibl. 28, illus. [Argonne Nat. Lab., Lemont, Illinois]

The *in vitro* sensitivity of indoleacetic acid (IAA) to X- and γ-radiation has been re-examined by a kinetic approach. No unusual lability of the auxin was observed on varying the auxin concentration or purity, oxygen concentration, H+ concentration, radiation energy, dose rate, or method of assay. Ionic yields were near unity. Acid auxin extracted from the plant exhibits an intrinsic radiosensitivity not significantly higher than synthetic IAA. The

effects of several cosolutes and plant extracts on IAA destruction were examined to determine the relative radical affinity of the auxin. The above observations indicate that an explanation other than direct auxin photolysis probably accounts for the lowering of auxin levels in plants exposed to low doses of ionizing radiation.—From authors' summary.

627† BLACK, C. A. and others. **Willcox's agrobiology : 4. Review of Willcox's reply.** *Agron. J.* 1955, **47,** No. 11, 497-8. [Iowa Agric. Exp. Sta., Ames]

The authors conclude that Willcox's agrobiology has no scientific basis, is internally inconsistent, externally in conflict with experimental evidence and unworthy of further serious consideration. [See also *Fld Crop Abstr.* 8 : 659, 660 and 661.]—P.J.B.

628† WILLCOX, O. W. **Quantitative agrobiology : 5. Further comments on Black, Kempthorne and White's criticisms of " Willcox's agrobiology."** *Agron. J.* 1955, **47,** No. 11, 499-502, bibl. 16. [197 Union St., Ridgewood, New Jersey]

The author refutes the objections made in the paper referred to in the previous abstract in respect of the validity of the Mitscherlich yield equation and, in particular, the inverse yield-nitrogen law and the nitrogen constant 318. The author discusses the objections raised concerning his statistical methods and maintains that current statistical techniques based on the Gaussian theory of probability have no validity for the analysis of data on the direct interaction of crops and manures. [See also *Fld Crop Abstr.* 8 : 659, 660 and 661.]—P.J.B.

MISCELLANEOUS

629† NILSSON-LEISSNER, G. Världens livsmedelsförsörjning. Nuvarande läge och framtidsutsikter. [**World food supplies. Present position and future prospects.**] *Svensk. geogr. Årsb.* 1955, **31,** 9-36.

630 FRAUENDORFER, S. Welternährung und Bevölkerungszuwachs. Ein Literaturbericht. [**World nutrition and population increase. A literature review.**] *Bodenkultur* 1954, **8,** No. 1, 57-70, bibl. 33. [Wien, Austria] [Received Sept., 1955]

This review covers the work of many British and American authors, as well as some German and French ones. The review closes with the hope that, at least for Europe, there will be international planning along the lines of Boyd-Orr's proposals.—D.B.

631† MINISTRY OF AGRICULTURE, FISHERIES AND FOOD ENGLAND AND WALES. National Agricultural Advisory Service. **Provincial field experiments in agriculture. Summary of experiments in progress during the harvest year 1954-55.** 1955, pp. 53.

632† MINISTRY OF AGRICULTURE, FISHERIES AND FOOD ENGLAND AND WALES. National Agricultural Advisory Service. **Experiments in crops and livestock in progress at the experimental husbandry farms, 1954-1955.** 1955, pp. 25.

633 MAXWELL DARLING, R. C. **Agricultural research in the Sudan Gezira.** *E. Afr. agric. J.* 1955, **21,** No. 2, 112-15, illus.

A survey is given of the work done by the Research Division of the Sudan Ministry of Agriculture in the Gezira.—M.P.

634† CHAMBERLAIN, G. T. **The major and trace element composition of some East African feeding stuffs.** *E. Afr. agric. J.* 1955, **21,** No. 2, 103-7, bibl. 29. [E.A.A.F.R.O., Kikuyu, Kenya]

Analysis figures are given of 18 feeding stuffs in use in East Africa, including barley, beans, bulrush millet, lucerne, lupin seed (Giant White), white maize and oats.—M.P.

635† ILJIN, W. S. **Yield and chemical composition of commercially-fertilized plants in the tropics.** [Contained in] *Plant analysis and fertilizer problems. A colloquium organized by the Inst. Rech. Huiles et Oléagineux* (*8th Internat. Bot. Congr.*) 1954, 143-50, bibl. 22. [Cent. Univ., Maracay, Venezuela]

This is a study of the effect of N and P fertilizers on crops when grown on red lateritic and more fertile clay soils. The crops used for these experiments included *Melinis minutiflora, Sorghum, Panicum maximum, Cajanus indicus, Lathyrus indicus, Pueraria phaseoloides, Crotalaria* and *Oryza sativa.* Tables show the effect of fertilizers on the chemical composition of these crops.—D.B.

636† CALDWELL, T. H. **The foliar application of nutrients for the treatment of deficiencies in crops.** *N.A.A.S. quart. Rev.* 1955, No. 30, 241-52. [N.A.A.S. Eastern Province, Trumpington, Cambridgeshire]

Aspects reviewed include : the use of foliar sprays

for the correction of nutrient deficiencies ; methods of applying foliar sprays ; the foliar application of urea, P, K, Mg, Fe, Mn, Cu and B, and combinations of nutrients.—P.J.B.

637† COMMISSION FOR TECHNICAL CO-OPERATION IN AFRICA SOUTH OF THE SAHARA. **Systematic botanists and zoologists working in Africa.** *Publ. 13. C.S.A./C.C.T.A.* 1954, pp. 35. [London and Bukavu (Belgian Congo)]

638† COMMISSION FOR TECHNICAL CO-OPERATION IN AFRICA SOUTH OF THE SAHARA. **Directory of scientific institutes, organizations and services in Africa south of the Sahara.** *Publ. 14. C.S.A./C.C.T.A.* 1954, pp. 135. [London and Bukavu (Belgian Congo)]

639† COMMISSION FOR TECHNICAL CO-OPERATION IN AFRICA SOUTH OF THE SAHARA. **List of scientific societies in Africa south of the Sahara.** *Publ. 16. C.S.A./C.C.T.A.* 1955, pp. 33. [London and Bukavu (Belgian Congo)]

640† COMMISSION FOR TECHNICAL CO-OPERATION IN AFRICA SOUTH OF THE SAHARA. **Co-operative societies. Inter-African Conference.** *Rep. I E 2. C.S.A./C.C.T.A.* 1954, pp. 60. [Ibadan]

641† GLOVER, J. and others. **Assessing the reliability of rainfall if monthly falls are not independent.** *J. agric. Sci.* 1955, **44,** Pt. 4, 387-8, bibl. 3. [E.A.A.F.R.O., Muguga, Kenya]

This paper rectifies an incorrect statement made in an earlier paper [*see Fld Crop Abstr.* 7 : 687, 1056] on a method for obtaining the probability of a given pattern of rainfall when association existed between the different months.—M.P.

642 IHM, P. Eine exakte Methode als Ersatz für die Varianzanalyse in bestimmten Fällen. [**An exact method to replace analysis of variance in certain cases.**] *Züchter* 1955, **25,** No. 11/12, 365-8, bibl. 10. [Bot. Inst., Univ. Freiburg i Br.]

643† BULLEN, E. R. **The interpretation of field trial results.** *N.A.A.S. quart. Rev.* 1955, No. 30, 232-40. [N.A.A.S. Eastern Province, Trumpington, Cambridgeshire]

This outline is given mainly for the guidance of advisory officers.—P.J.B.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

644 **Great Britain.** Norfolk Agricultural Station. 47th Annual Report 1954-55. Sprowston, 1955, pp. 18.

INVESTIGATIONS REPORTED :

1. Fertilizers for vining peas, p. 8. Fertilizer trials with vining peas indicated that only on very P-deficient soils did dried peas respond to phosphates. The yield response to K was small. N was not beneficial, and in many cases depressed yields.

2. Chemical weed control in sugar-beet, pp. 8-10. Solutions of nitrate of soda and common salt were the only successful post-emergence treatments for weeds in sugar-beet. The use of 2·5 cwt. nitrate of soda per ac., as a spray, proved economical and equivalent in manurial value to similar quantities of nitrate of soda applied as a dry top-dressing or on the seed-bed. At least 0·5% of a wetting agent was required with the nitrate of soda for control of fumitory, knot grass, chickweed and willow-weed. but none was required for charlock and wild radish. Nitrate of soda was sprayed at 2, 2·5 and 4 cwt. per ac. and the resultant kill was 53%, 70% and 80%, respectively. The use of PCP as a pre-emergence spray was found to require accurate timing because of its injurious action on beet seedlings. IPC at 3 lb. per ac. gave over 75% control of knot grass and chickweed whether sprayed immediately after drilling or just before beet emergence. With thorough working into the seed-bed, using a disc harrow, IPC, at 3 lb. per ac., gave 96% control compared with 60% with light harrowing. TCA at 5 lb. per ac. and CDEC at 8 lb. per ac. compared favourably with IPC for the control of wild oats.

3. Crop variety testing, p. 11. Winter-oats. In half the trials carried out, Hybrid No. 7, from the Welsh Plant Breeding Station, outyielded S147. Its straw is much stiffer and shorter and it is slightly earlier in maturity than S147. Spring barleys. The malting varieties Maythorpe and Provost outyielded Kenia by 3%. Maythorpe is early-maturing, its 1000-grain weight is 5% higher than Kenia and it is slightly less resistant, and Provost slightly more resistant, to lodging than Kenia.

4. Cereal cultivation experiments, pp. 12-13. Under Sprowston conditions the autumn wheat

variety Hybrid 46 yielded best when sown in 4 in. rows at 1·25 bu. per ac. The maximum economic top-dressing of nitro-chalk was around 4 cwt. per ac. Contrary to previous results with other varieties, the time of application of the fertilizer had little effect on the yield of H46, and the increased yields after split dressings did not justify the extra cost involved. Top-dressings of 4-6 cwt. nitrochalk per ac. appeared suitable for spring wheat varieties such as Atle.

5. Sugar-beet experiments, p. 13. Ethyl mercury phosphate, as a seed dressing, improved germination by 10% compared with similar seed dressed with Mergamma.—M.P.

645 **Great Britain.** Hasler and Co. Ltd., Essex. Sixth Report on trials and experimental work carried out at Throws, Little Dunmow, 1953-54. By P. R. Hayward. [n.d.] pp. 36, illus. [Received Aug., 1955]

INVESTIGATIONS REPORTED :

1. Winter-wheat trials, pp. 4-9. Of varieties with a superior grain quality, Yga and Glasnevin Rosa had a higher yield potential than the other varieties in the group ; Yeoman was also satisfactory. Atle grown as a winter wheat was promising. In the quantity wheat trial, Minister, Capelle Desprez and Hybrid 46 were top yielders. The variety Later was the poorest yielder owing to the effect of the bad weather on this very early variety; Yga also gave a low yield.

2. Small-scale winter-wheat trial, pp. 9-10. Selection 1/52 from Petit Quin Quin yielded similarly to Eclipse, the top-yielder, in the red-chaff red-grain variety trial and had a slightly better standing ability than the other varieties.

3. Spring-barley seed rates and top-dressing trial, pp. 11-13. At all N-levels, yields from Rika barley were greater at the 1·5 bu. than the 3·0 bu. per ac. seeding rate, whereas Proctor showed no significant difference in yields at the 2 seeding rates. The beneficial effects of N top-dressings were independent of variety and seed rate, but early, heavy applications of N tended to enhance lodging at the higher seed rate. A split application of 1·5 cwt. of N applied early and 1·5 cwt. of N applied late appeared to be as effective in raising yields as one heavy, early or late application.—M.P.

646 **Northern Ireland.** Agricultural Research Institute. Twenty-eighth Annual Report, 1954-55. [n.d.] pp. 37, illus. [Received Oct., 1955]

INVESTIGATIONS REPORTED :

1 Oat varieties and manuring, pp. 24-5. In rate and time of fertilizer application trials with the oat varieties Sun II, Milford and Palu, lodging was severe owing to the very unfavourable weather. The application of sulphate of ammonia one month after sowing the crop resulted in higher yields of oats than when applied at sowing or two months later.

2. Barley varieties and manuring, pp. 25-6. The varieties Ymer, Freja, Herta and Proctor were sown at 140 and 168 lb. per ac. Response to 0·75 and 1·5 cwt. sulphate of ammonia was slight, and the 2·25 cwt. dressing gave a fair amount of lodging. Although Herta outyielded the other varieties by 2 cwt. per ac., the varieties differed little in their response to N applications and there was no effect of seed rate on yields. Sampling-technique studies indicated that in barley trials involving comparisons between varieties and between seed rates, the outer rows of plots should be discarded before harvesting.

3. Weed control, pp. 26-7. Increasing the spray level from 0·75 to 1·5 lb. acid equivalent K salt of MCPA per ac. gave a slight increase in effectiveness in the control of redshank (*Polygonum persicaria*) in crops undersown with clover. Increasing the volume of application from 5 to 30 gal. per ac. gave a very significant increase in effectiveness. Plant counts showed that red clover survived spraying better than white clover and plots sprayed with 1·5 pt. per ac. had higher plant counts than plots sprayed at 3 pt. per ac.—M.P.

647 **Republic of Ireland** Department of Agriculture. Field Experiments, 1952. *J. Dep. Agric. Republ. Ire.* 1953-54, **50,** 163-79. [Received Nov., 1955]

INVESTIGATIONS REPORTED :

1. Spring wheat variety trials, pp. 163-6. In 1952 the yields of Atle, Progress, Karn II and Ella did not differ significantly.

2. Oat variety trials, pp. 167-70. The average yield of Triumph, 25·6 cwt. per ac., was significantly higher than that of Sun II, 23·9 cwt. per ac.

3. Barley variety trials, pp. 171-4. Herta significantly outyielded Beorna, and Ymer outyielded Beorna and Glasnevin 22. There was no significant difference in yield between Ymer and Herta or Beorna and Glasnevin 22.

4. Trials with a Gammexane organo-mercurial seed dressing, pp. 175-7. In centres where wireworm attacks were heavy, this dual-purpose dressing gave protection to spring wheat and oats and yields were greater, whereas the standard organo-mercuric dressing gave no protection against damage from wireworms. Both types of dressing effectively controlled seed-borne diseases of oats and spring wheat.

5. Fodder-beet variety trials, pp. 178-9. Yellow Globe mangel gave the highest yields of roots per ac. but the lowest yields of dry-matter per ac. of roots in a trial which included Barres Øtofte Nova X mangel, sugar-beet, and the fodder-beet varieties Hunsballe IX, Gul Øtofte X, Rod [Red ?] Otofte X and Triumf. These varieties did not differ significantly in dry-matter yields.—M.P.

648 **France.** Institut National de la Recherche Agronomique. [Annual Report for 1952.] Paris, 1955, pp. 328, illus.

INVESTIGATIONS REPORTED

1. Influence of temperature on the density of ears in a wheat crop. H. Geslin, pp. 55-7. It has been observed that the same variety of winter wheat, sown in autumn, produces a greater number of ears per unit area when grown in the north of France and in the Paris region than when grown in Brittany and Normandy where average daily temperatures are higher in autumn, winter and early spring. These results explain the regional differences in yields and show the importance of a cold winter for a high rate of earing which is an important factor in yield. The production of a specific hormone has been suggested as the cause.

2. The influence of solar radiation on the maturation of wheat grain. M. Godard, pp. 57-8. Horizontal movable vellum screens were used on sunny days to reduce the intensity of solar radiation which reached test plants. A screen which transmitted 48% of solar radiation had no noticeable effect on green weight, dry weight or final yield of grain, while a screen which transmitted only 36% resulted in a decrease in green weight, dry weight and yield. This raises the question of a threshold value of radiation below which plant development is hindered. In the circumstances of the above experiment this threshold value was 40% of the radiation normally received.

3. Irrigation experiments on maize under controlled conditions. M. Godard, pp. 62-4. (a) By beginning irrigation on 12 July, i.e. 12 days later than in the control plots, there was an economy of water which can be particularly advantageous in dry years. (b) The cessation of irrigation (begun 1 July) on 25 July, i.e. a few days after flowering of the female plants (20 July), resulted in a 25% reduction of yield compared with controls, the reduction being essentially due to a reduction in the 1000-grain weight.

4. Nitrogen nutrition of wheat, pp. 83-4. In pot experiments, N applied at earing increased the weight of grain per ear by 15-20%. In field experiments conducted in Finistère and the Somme valley, N applied at flower formation (in addition to two earlier applications) resulted in an 8-10% yield increase. A further application at heading gave no further improvement. These experiments provide evidence for spacing the N applications.

5. Herbicides in cereal crops, pp. 86-7. The following are among the most important results. (a) There is no essential difference in the mode of action of amine salts and Na salts of 2,4-D ; the former, however, are a little more active. (b) Very small doses of the Na salt and the ethyl ester of 2,4-D (0·5 kg./ha.), applied at tillering, produced very distinct deformations and the ester applied at elongation caused sterility and reduced yields. Tillering and elongation were the two stages at which the cereal was most sensitive to the herbicide. (c) Dinitrobutyl phenol is a perfect herbicide to use in cereal fields if applied early. Late applications damage the cereals. (d) MCPA applied to cereals at the pre-emergence stage at the rate of 1 kg./ha. destroyed mustard without having any harmful effect on the cereal. When applied to maize which had reached a height of 50 cm., there were marked vegetative changes.—D.B.

649 **Kenya** Department of Agriculture. Annual Report for 1953. Vol. 2, Record of Investigations. Nairobi, 1955, pp. 205. [Received Oct., 1955]

INVESTIGATIONS REPORTED :

1. Report of the Senior Entomologist, pp. 1-11. Barley yields were significantly increased when 2·5% Aldrin dust, applied at 40 lb. per ac., was used to control the chafer grub, *Schizonycha* sp. Army worm (*Laphygma exempta*) was 100% controlled by 5 oz. Endrin emulsion or 7·5 oz. DDT emulsion per ac.

2. Report of the Senior Research Officer (Plant Pathology), pp. 12-18. Fumigation with methyl bromide had no effect on the germination of bean, sunflower and cotton seed. When planted 2 hr. after fumigation, linseed showed decreased germination, but after 2 weeks' exposure to the air, germination was normal. Fumigated groundnuts were slower to germinate than the unfumigated controls.

3. Report of the Soil Chemist, pp. 19-34. Determination of the moisture content of maize at Nairobi and Mombasa showed agreement between the Brown-Duvel distillation method and the standard 2-stage oven drying method. Values obtained using a Marconi Moisture Meter agreed better at the 2 localities, but were higher than by the other two methods. The official use of the Marconi Meter should continue but it is recommended that the Marconi firm be asked to produce a calibrated scale based on the standard method.

4. Report of the Senior Plant Breeder, pp. 35-63. Wheat Cross 318 was found to be particularly susceptible to frost and take-all damage; R64 and Sabanero were considerably more resistant to frost. The 360 F8X series were top-yielders in trials at Eldoret but at Njoro the yields of varieties did not differ significantly. At Ol Joro Orok, two DC × Ceres selections were again at the top, followed by Capella, a promising durum wheat. Yields in trials on the Kinangop were low, due to drought, but the 362 series showed most promise. Barley. The Scandinavian varieties Kenia and Herta were released to farmers. At Njoro, Heimdal was the heaviest yielder, it grew vigorously and suppressed weeds effectively. Kenia, No. 5, Ymer and Balder also yielded well. At Ol Joro Orok, Velvon proved superior in adaptability and yield, followed by

Prior (Hopkins) and Trebi. A low yield was again given by Golden Archer. Oats. At Eldoret, Lampton yielded most, followed by Ajax, while at Ol Joro Orok, the grain types Boone, Tama, and Vicland were the 3 top-yielders. At both places yields of Grey Algerian were disappointing.
5. Report of the Plant Pathologist (Plant Breeding), pp. 64-6. Two new rust forms, K13 and K14, of *Puccinia graminis tritici* were identified this season on the wheats 360H and DC × Ceres R64, respectively. [See Abs. 20.]
6. Report on horticulture. Peas, pp. 123-4. In variety trials at Molo, Unica, Servo and Mansholts Pluk yielded 2511, 1802 and 1778 lb. per ac., respectively.
7. Report on experimental work in general husbandry, Rift Valley Province, pp. 160-76. Results of numerous fertilizer trials indicated the value of phosphates, especially double supers, and other fertilizers for increasing cereal crop yields in nearly all localities. In a ley establishment trial at Eldoret the yield of grain and straw of wheat sown at 7 in. or 14 in. was reduced by undersowing with a ley. The ley yielded more when sown under 7 in. spaced wheat than under 14 in. spaced wheat as a pure ley stand. At Ol Joro Orok yields of oats sown on vlei soils at ridge widths of 12, 18, 24 or 36 ft. did not differ significantly. For barley, a mixture of 75 lb. double supers and 25 lb. sulphate of ammonia per ac. was most satisfactory. At Londiani the drainage requirement of vlei soils was studied. Wheat 318 gave better growth and yields, in 1953, on mole-drained than on non-mole-drained plots.
8. Report on experimental work in Central Province, pp. 177-88. Cassava grown at 6 × 6 ft. spacing yielded (insignificantly) better than at the 4 × 4 ft. spacing. There was no increase from ridged over flat cultivation at either spacing.
9. Report on experimental work in Coast Province, pp. 189-94. Manuring increased sorghum and green gram (*Phaseolus radiatus*) yields, and at Shimba Hills ridging increased gram yields while mulching increased sorghum yields. At Kibarani, in a cotton variety trial, UK.48 outyielded S.47 and C. (50) 17.
10. Report on experimental work in Nyanza Province, pp. 195-201. In a cassava date-of-harvesting and variety trial, Alpin Valenca was top yielder when harvested at 12, 18, 24 and 30 months, and Binti Minsi lowest. So far none of 6 varieties on trial has shown mosaic symptoms. Yields of wimbi [finger millet], grown as the long rains crop, were again reduced by ridging.
11. Report on experimental work in Southern Province, pp. 202-5. In the short rains, grain sorghum showed a significant yield response to ridging and manuring, but mulching increased straw yields only. Phosphate application to bulrush millet increased grain yields appreciably.—M.P.

650 **Zanzibar** Department of Agriculture. Supplement to the Annual Report, 1954. Results of field experiments, crop and stock records and other statistics. Zanzibar, 1955, pp. 12.

INVESTIGATIONS REPORTED :
1. Six fertilizer trials with sorghum on kinongo soils, pp. 1-2. The average yield increase from applications of 120 lb. sulphate of ammonia per ac. was 188 lb. of grain per ac. Muriate of potash produced no significant results.
2. Two fertilizer trials with rice on kinyefu soils, (Pemba), pp. 2-3. The value of superphosphate was shown. A dressing of 2 cwt. each of sulphate of ammonia and superphosphate per acre appeared most profitable.
3. Three fertilizer trials with rice on mtifutifu soils, (Pemba), pp. 3-4. Nitrogen increased yields in the presence of phosphate only. A dressing per acre of 2 cwt. each of sulphate of ammonia and superphosphate gave an average increase of 855 lb. paddy per ac., and proved the most economic.
4. Variety trials with hybrid cassava, p. 5. The Amani varieties 4674/4, 46106/27, and 46106/26 were top yielders and were capable of yields twice as great as the local variety Msitu. Their palatability is good. They are only slightly susceptible to virus infection.
5. Variety trials with yams, p. 5. The value of using compost for increasing yields was shown. The varieties Joka, Mondoo and Bottleneck Lisbon yielded slightly more when planted in prepared holes than when planted on ridges.
6. Trials with fallow-crops between rice seasons, p. 6. Experiments were begun to determine the most advantageous treatment of rice land between crops when the cultivation is entirely mechanical. In the first year, sweet-potatoes, as a catch crop, grown on ridges gave greatly increased yields when compost was applied at 20 tons per ac.—M.P.

651 **Jamaica** Department of Agriculture. Investigations 1953. *Bull. 53.* (*N.S.*) *Dep. Agric. Jamaica* [n.d.] pp. 163. [Received Oct., 1955]

INVESTIGATIONS REPORTED :
1. Testing of weedicides, pp. 28-30. In the control of both *Mimosa pudica* and *Weidela trilobata*, applications of 2,4,5-T alone or in conjunction with 2,4-D were more effective than RD 4236. For *Mimosa* control, " billing " (a light-cutting with a machete) before spraying was adequate as a cultural treatment with 2,4,5-T and 2,4-D, but best results were obtained by forking when RD 4236 was used. For the control of *Weidela* no cultural treatment was needed.
2. Maize variety trials, pp. 30-1. The standard local variety J.S.Y. significantly outyielded the dent variety Mayorbella from Puerto Rico by 4 bu. per ac.

3. Rice variety trials, pp. 31-3. In the spring-sown trial the varieties Fortuna (Dominican Republic), Bluebonnet 50 and Fortuna (USA) were top-yielders. In the autumn-sown trial, Bluebonnet 50, Century Patna 231, Texas Patna and Buffalo were best.
4. Potato variety trials, pp. 41-5. Yields varied with the locality, but Arran Consul, Up-to-date and Alpha were satisfactory yielders in most places. Up-to-date, however, was susceptible to blight and required careful spraying, whereas Alpha was resistant. The Canadian varieties Sebago and Green Mountain were also satisfactory.
5. Potato storage trials, pp. 45-7. The degree of decay and the time taken to reach maximum decay, and the amount of sprouting varied with the potato varieties under observation and with the storage locality.
6. Cassava variety trials, pp. 47-8. Smalling and Bobby Hanson were top yielders (after adjustments to allow for differences in population numbers). The varieties were all harvested on the same date.
7. Fertilizer demonstration plots. Yams, pp. 72-9. Response to all the nutrients was positive. The average plot yield with compost and fertilizer was 72 lb. and exceeded by 7 lb. the average of plots receiving fertilizer only.—M.P.

652 **USA.** Florida Agricultural Experiment Station. Annual Report for the fiscal year ending June 30, 1954. [n.d.] pp. 326. [Received Jan., 1956]

INVESTIGATIONS REPORTED :

Cereals, p. 48. In varietal trials, highest yielding varieties were Seminole, Sunland and Floriland oats ; Coker's 47-27 wheat, and 8-21 rye.

Fibre crops. By R. V. Allison and others, pp. 216-17. In trials with the El Salvador variety of *Hibiscus cannabinus*, grown on peat and sandy soils in S. Florida, fibre percentages did not increase after 100 days' growth and fibre yields did not increase after 125 days' growth.—P.J.B.

653 **India.** Agricultural Institute, Allahabad, Report of the Agronomy Department for 1954-55. By A. K. Ghosh and others. [Contained in] *Allahabad Fmr* 1955, **29,** No. 5, 115-41.

INVESTIGATIONS REPORTED :

1. Maize breeding and testing, p. 125. In the breeding and testing of maize, the better hybrids, like Alagin 13 (R84 × 38·11) (R75 × K4), and (J11 × R61) WF9 outyielded the best open-pollinated varieties.
2. Seed rate and row widths of wheat, p. 126. Varying the rates of sowing from 40 to 100 lb. per acre did not affect the grain and straw yield. Six-inch row widths resulted in early ripening and the highest grain and straw yields. With the same rate of seeding, as row widths increased (6, 9, 12 and 15 in.), the plant population per acre decreased, plant erectness was favoured and ripening was delayed.
3. Direction of sowing maize and wheat, pp. 127-9. The yield from maize sown in north-south rows was significantly higher than that from east-west rows. Yields of wheat were not consistently higher from north-south rows than from east-west rows.
4. Weed control, pp. 129-34. With maize, the use of 2,4-D as a pre-emergence spray followed by 2 cultivations resulted in a total yield of ears and stover equal to that from maize cultivated 4 times, but not sprayed. Sawan (*Panicum miliare*) yielded more on the cultivated plots than on those receiving 2,4-D. Control of weeds and an increase in sawan yield resulted from using 2,4-D as an early post-emergence spray. Yields of wheat were equally raised by post-emergence spraying of 2,4-D as by mechanical cultivation, but were depressed by the pre-emergence spray.
5. Potato planting, p. 140. In a potato-spacing experiment, using medium sized tubers, 24 in. between rows and 8 in. between tubers gave the highest yields, when compared with spacings 28 × 8 in., 24 × 6 in., and 21 × 4 in.—P.M.G.

654 **India.** Institute of Plant Industry, Indore. Progress Report for the year ending 31 May, 1955. Madhya Bharat, pp. 87, summary pp. i-xii.

INVESTIGATIONS REPORTED :

1. Cotton varieties, p. ii. Malvi 17 was superior to its sister strains in fibre properties. Indore 5 was superior in yield and ginning percentage, and nearly equal in lint properties, to the old variety Indore 2.
2. Agronomy, p. iii. The intercropping of cotton and groundnuts proved more remunerative than groundnuts grown alone. The rotation groundnut/cotton proved more profitable than 6 other rotations tested. A seed rate of 30 lb. per acre gave a significantly higher yield of seed cotton than a rate of 10 lb.
3. Plant protection, p. iv. Jassids on American cotton were controlled by 0·15% DDT with 0·1% BHC spray at 40 gal. per ac.—P.M.G.

655 **Australia.** Commonwealth Scientific and Industrial Research Organization. Sixth Annual Report for the year ending 30th June, 1954. Canberra, 1954, pp. 179. [Received September, 1955]

INVESTIGATIONS REPORTED :

Linseed varieties, p. 24. In several localities Punjab × Walsh selections appeared superior to Walsh in oil content and yield per ac.

Crop irrigation, Northern Australia, pp. 74-5. Yields of safflower and sorghum were 20% higher

when the interval between waterings was 12 days than when it was 24 days. Rice had a water requirement (including rainfall) of 75-80 ac.-in.—M.P.

656 **Australia.** New South Wales Department of Agriculture. Report for the year ended 30th June 1954. Sydney, 1954, pp. 79, illus. [Received August, 1955]

INVESTIGATIONS REPORTED :

1. Pasture ley experiments, Wagga Agricultural College and Experiment Station, p. 15. The average yield of 3 wheat varieties was increased from 7·4 bu. to 28·4 bu. per ac., and the protein content of Bencubbin raised from 7·64% to 12·14%, after a period of pasture ley.

2. Intensity of cropping experiment. Wagga College, p. 15. Following the pasture ley period, grazing oats, in rotation with wheat, gave the best results. The wheat/grazing oat/fallow rotation over 7 years, outyielded all other treatments by 2.6 bu., and the oat provided winter grazing in 3 of the years.

3. New barley variety. Wagga College, p. 15. A 6-row, Abyssinian × Flynn crossbred barley has been registered, and will be known as Ablyn. Barley outyielded oats by an average of 342 lb. grain per ac. over 3 years at Trangie Experiment Station.

4. Potato varieties, p. 18. Two new releases, both Pontiac × Katahdin selections, were Crana, an early red-skinned type and Awaba, a later-maturing, white-skinned type.

5. Control of skeleton weed (*Chondrilla juncea*), p. 22. [See *Fld Crop Abstr.* 8 : 269.]

6. Oats, Wagga College, p. 68. The local variety, Curlew, was outstanding in trials and yielded 40-50 bu. per ac.—M.P.

BOOKS

657 BLANCK, F. E. [Ed.] **Handbook of food and agriculture.** 1955, pp. vii + 1039, bibl. at end of chaps., illus., New York ; Reinhold Publ. Corp., 24 × 15 cm.

In an ambitiously worded description, the publishers claim that this book contains " in concise form the most important, most up-to-date information available on soils and plant growth, fertilizers, insecticides, nutrition, storage of raw products, food processing, packaging, waste disposal and many other topics." The reader will have to decide for himself whether 26 chapters covering some 1000 pages offer sufficient space to do justice to this wide range of subjects, and to what extent the individual authors have been equal to this difficult task. The editor has given them every freedom to develop their topic as they saw fit, and consequently, scope, length and quality of separate contributions are far from uniform. In general, where the aim has been fairly narrowly defined, as in L. P. Miller's article on growth substances (here for some reason called growth regulants), the results are informative though, of necessity in only 20 pages, not very far-reaching. By contrast, soil microbiology is discussed so briefly, in such general terms and without reference to any recent work, as to offer little new information to anyone with higher school education.

The editor's leniency shows itself in a certain amount of duplication, some of it difficult to avoid in a book of this kind, and in the relative arrangement of the articles. Thus, organic herbicides are discussed before the more basic concepts of growth substances have been described. A general chapter on the chemistry of plants appears in the middle of the book, following fairly detailed accounts of vegetable fats and oils and of cereal products.

It is only fair to point out that this is an American book intended mainly for American readers. Considerable space is devoted to such topics as fertilizer consumption in the United States of America, food legislation, disposal of food wastes, and Congressional reports on chemical food preservatives. The book is, on the whole, well produced and clearly printed.—R. H. M. Langer.

658 INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT. **The economic development of Nigeria. Report of a Mission.** 1955, pp. xxii + 686, illus., maps, Baltimore ; John Hopkins Press, 23 × 15 cm., $7·50.

The Mission, of which this is the report, was organized at the request of the Governments of Nigeria and the United Kingdom. Its purpose was to assess the resources available for future development and, after study of the possibilities, to recommend the practical steps which should be taken. The report is presented in three parts, the first containing general recommendations for a five-year programme of development, the second containing a series of technical reports and the third consisting of appendices, mainly on finance.

In reviewing the background against which their recommendations are made, the Mission comments that they did not find Nigerians appreciative of how much development would depend on their personal efforts and initiative. In the Mission's view they look too much to the Government for help. Nevertheless the report concludes that much of the efforts up to 1960 should be directed to strengthening the governmental services which will support an expansion in production.

Agricultural development has a very large part to play in this programme, for the Mission

states that in the near future industrial expansion cannot have an impact on living standards as big as that from agricultural advances. The subjects of technical reports concerned with agriculture include the produce marketing boards, the pattern of Nigerian agriculture ; agricultural export commodities ; domestic crops, livestock and fisheries ; marketing, storage and co-operatives ; and the agricultural development programme. Broadly speaking, the Mission concludes that research, surveys, demonstration and extension are the first needs. Though the Mission believes that large-scale expansion in the output of most products must await more fundamental work, it sees possibilities of quick results in certain directions if the demonstration services were better organized.

Finally the Mission stresses that the programme they propose is an integrated one. It is for Nigeria to decide how far it will accept the proposals ; but modification of one part would require amendment elsewhere.

Reviewing the report as a whole, there is much in the recommendations which is familiar. However, it may well be that the final report of such a Mission is of minor importance compared with the consultations and discussions which went to its preparation.—K. E. Hunt.

659 SINNOTT, E. W. and WILSON, Katherine S. **Botany : principles and problems.** 5th edn 1955, pp. 538, London (New York ; Toronto) ; McGraw Hill Book Co., Inc., 26 × 20 cm., $6·75.

This work will rank among those textbooks of botany which one reads with pleasure as well as profit. The contents, viz., anatomy and physiology of the living plant followed by systematic treatment of the phyla from algae to angiosperms, follow the well-known pattern ; the difference is in the approach which is both living and historical. The authors have been at pains to bring this 5th edition up to date, especially as regards metabolism, photosynthesis and respiration. This same aim is evident in the chapter on fungi where penicillin is given a prominent position. One notes that the terminology is in some respects different from that normally used in Great Britain. The authors state that they have been particularly anxious to improve the quality of the illustrations. This object has certainly been achieved, for seldom have line drawings and text figures been reproduced so clearly, or photographs been presented so beautifully and from so arresting an angle.—D. Brown.

660 RUHLAND, W. [Ed.] Handbuch der Pflanzenphysiologie. Band 1. Genetische Grundlagen Physiologischer Vorgänge. Konstitution der Pflanzenzelle. **Encyclopedia of plant physiology. Volume 1. Genetic control of physiological processes. The constitution of the plant cell.** 1955, pp. xx + 850, bibl. at end of chapters, illus., Berlin ; Springer-Verlag, 25 × 18 cm.

661† COMAR, C. L. **Radioisotopes in biology and agriculture.** 1955, pp. xiii + 481, bibl. at end of chapters, illus., London (New York ; Toronto) ; McGraw-Hill Book Co., Inc., 24 × 16 cm., 67s. 6d.

662† FAO/UNKRA. **Rehabilitation and development of agriculture, forestry and fisheries in South Korea.** 1954, pp. xviii + 428, illus., maps, New York ; Columbia Univ. Press, $8·75.

663 MITUSI, S. **Inorganic nutrition, fertilisation and soil amelioration for lowland rice.** 1955, pp. 107, illus., Tokyo ; Yokendo, Ltd., 22 × 15 cm., $1·50.

Correction. In the review of *Cotton growing problems* (Abs. 304) it was stated that the book contained no reference to *Prodenia*. This is incorrect as this pest is dealt with by the authors on pp. 526-7. The error is regretted.—Editor.

NEWS ITEMS AND NOTES

Great Britain

664† TROPOTOX, a new herbicide, has been tested by the manufacturers and recommended as follows: for clovers, it can be sprayed when 50% of the plants have reached the first 3-leaf stage; for cereals, from the 2-leaf stage onwards; for certain pea varieties, such as Clipper, Emigrant, Onward, Rondo and Servo, at the 3- to 6-expanded-leaf stage. The pea variety Meteor is susceptible to the weedkiller and Kelvedon Wonder is not completely resistant. Tropotox can be used at a much earlier stage than other weedkillers, it controls many annual and perennial weeds, and has the advantage of extending the spraying season. *Dairy Fmr* December, 1955.—M.P.

665 WORLD MAPS OF ATMOSPHERIC WATER-VAPOUR PRESSURE. The World Climatology Branch of the Meteorological Office has produced world maps of mean atmospheric water-vapour pressure for the months of January, April, July and October. The maps, which are on a Mercator projection, measure 24 in. x 45 in. and extend from 75°N. to 60°S. The vapour-pressure values are as near as possible means of 24 hourly values per day reduced to sea level by a new formula. Between three- and four-thousand stations have been used. It is hoped to publish these maps in the near future. *Met. Mag., Lond.* November, 1955.—C.L.S.

Switzerland

666† THE FEDERAL TECHNICAL UNIVERSITY IN ZÜRICH held its centenary celebrations in October, 1955. In addition to the official and academic functions, the celebrations included post-graduate courses of lectures. The general topic of the lectures in the Department of Agriculture was increase in productivity in agriculture. The text of the papers was published in *Schweiz. landw. Mh.* 1955, 33, No. 9/10, and the following are noted. Possibilities and limitations in crop production by R. Koblet. Possibilities for increased production in Swiss agriculture by recent methods of bacterial inoculation by T. Wilkén. Possibilities and limitations in the control of plant diseases by H. Kern.—D.B.

USA

667 GLASS MANURE. A trace-element-containing glass, bearing the trade name FTE, has been manufactured and used in USA. Salts of trace elements (Mn, Fe, Zn, Cu and Mo) are added to the frit. When bound in glass the trace elements are not washed out of the soil by rain; roots, on the other hand, are able to dissolve the glass (crushed) and use the nutrients. As a result of glass manuring, potato yields have been increased by 40% and maize yields by 2.2 dz./ha. Good results have also been obtained with other crops. *Dtsch. landw. Pr.* Sept., 1955.—D.B.

USSR

668 CULTIVATION MEASURES FOR CROPS. The 1955 November issue of *Agriculture* (the journal of the Ministry of Agriculture in the Soviet Union) contains information on crop production, considered from the following aspects: rotations of grain crops/potatoes for the non-chernozem belt; increasing the productivity of crops in rotations; evaluation of tillage operations in the central non-chernozem belt; herbage plants for crop rotations in the Krasnodar region; crop rotations at the Slavgorod State Selection Station; crop rotations on salty soils; and measures for obtaining high yields of sugar-beet.—M.H.

669† ZONAL COMMISSIONS. A decree issued by the Ukrainian Ministry of Agriculture creates five zonal commissions to render advice in the different Provinces on measures necessary to improve crop yields in the Ukraine. The centres for this information are located in scientific research institutes as follows:—(1) Commission for the far south zone, in the Ukrainian Sci. Research Inst. for Cotton Production, Herson (Kherson); (2) Commission for the central and northern steppe zone, in the Ukrainian Sci. Res. Inst. for Grain Husbandry, Dnepropetrovsk; (3) Commission for the forest/steppe zone, in the All-Union Sci. Res. Inst. for the Sugar Beet Industry, Kiev; (4) Commission for the forest zone, Ukrainian Sci. Res. Inst. of Socialist Agriculture, Kiev; (5) Commission for the mountain collective farms of the Carpathians and the Crimean hills, in the Institute of Agrobiology, Acad. Sci. Ukrainian SSR, Ljvov [formerly Lemberg].—M.H.

Tanganyika

670 THE TANGANYIKA AGRICULTURAL CORPORATION, which came into being on 30th March, 1955, is to continue the work of the Overseas Food Corporation in the areas which it has taken over. It will be invited by the Government of Tanganyika to assist in carrying on the Rufiji Basin reconnaissance survey at present in progress and will be asked to establish trial farms as part of this investigation. Other agricultural projects are also under consideration. *World Crops* August, 1955.—M.P.

South Africa

671† A NEW FLORA FOR SOUTHERN AFRICA is to be compiled under the editorship of Dr. R. A. Dyer. It will be a long-term project and will replace the *Flora Capensis* prepared at the Royal Botanic Gardens, Kew, between 1859–1925. The area to be covered by the *Flora* is the Union of South Africa, Basutoland, Swaziland and South West Africa. It will be co-ordinated as far as possible with the recently undertaken projects on the flora of the Federated States and Portuguese East Africa, *Flora Zambesiaca*, the *Flora of Tropical East Africa* and the *Flora of Angola*. The co-operation of all those interested will be welcomed. Information on the collection of specimens and the recording of the desired data may be obtained from the Chief, Division of Botany, P.O. Box 994, Pretoria. *S. Afr. J. Sci.* October, 1955.—M.P.

672† CONTROL OF QUELEA. The South African Depart-

ment of Agriculture recommends the use of poisoned bait by farmers from May to October when the birds are still scattered and before wheat crops come into ear. The bait should be prepared by overnight steeping of 40 lb. of small grain in 3 gal. of water containing 2 oz. Folidol emulsion, and drying the grain in the sun before scattering as bait. The Department of Agriculture is also willing to employ the explosive-fuel method from mid-February to the end of March. The co-operation of the farmers is sought and they are asked to report immediately to the Division of Entomology, Pretoria, all roosting and breeding colonies of quelea. The treatment of colonies with poison sprays is also being examined as a possible control measure. *Fmg in S. Afr.* October, 1955.—M.P.

India

673 NEW VARIETY OF SWEET-POTATO. Attention is drawn in *Allahabad Fmr* 1955, 29, No. 1, p. 44, to a new white Chinese variety of sweet-potato, named F.A. 17 White, which has been out-yielding Indian local varieties. Extensive trials conducted over a variety of soil and climatic conditions by the Indian Agricultural Research Institute, New Delhi, showed that the variety yielded from 125 to 255 maunds per acre. Its quality is good.—G.M.R.

Australia

674 PLANT AND SOILS LABORATORY. The work of the Division of Plant Industry and of the Division of Soils at Brisbane is outlined. Current projects include: the study of native and induced plant communities; legume bacteriology; plant nutrition, chemistry, introduction, breeding and genetics; climatology, agronomy and agrostology. The ultimate objective is the improvement and intensification of agricultural production as a whole, based on the production of improved pastures, in the coastal and sub-coastal regions of sub-tropical Queensland. *Publ. C.S.I.R.O.* 1955.—M.P.

New Zealand

675† PROCEEDINGS OF THE EIGHTH NEW ZEALAND WEED CONTROL CONFERENCE. The Conference was held in Hamilton in July, 1955, the following being among the papers read: Weed problems of the Waikato, by J. E. Bell; Ragwort control, by P. J. Balfour; Recent work on dock control using hormone weedicides, by R. B. Gordon; Control of barley grass in Hawkes Bay, by F. H. Collin; Clover tolerance, by S. Maclean; Weed control in young pastures, by L. J. Matthews; Pasture management and weed control, by I. L. Elliott; Results of aerial application in New Zealand, by P. S. Ferens; The potentialities of helicopter spraying, by C. S. Little; Some observations on bringing in gorse country, by E. A. Clarke; Control of difficult scrub weeds, by W. Johnston; Progress in the suppression of noxious weeds in Wanganui County, by R. D. Robertson; Weed control in maize crops in Gisborne District, by J. G. McKee; the control of weeds in *Brassica* crops, by J. F. Till; Weed control in drains, by G. L. Banfield; Water hyacinth in New Zealand, by D. I. Glue; Principles of pre-emergence weed control, by F. B. Thompson; The selective spraying of herbicides, by D. Edmond; Weed control in lawns and playing greens, by C. Walker; Grass-killing chemicals: recent results in the control of grass weeds in New Zealand, by P. B. Lynch; Crop tolerance trials with TCA, by J. S. Yeates; wheat tolerance to hormone weedkillers, by R. K. Ward; The volatility of weedkillers, by L. J. Matthews; The Australian weed problem, by S. W. Preston; Weed control in grassland in the United Kingdom, by H. P. Allen.—M.H. [The more important papers from the above will be abstracted in our next issue.—EDITOR.]